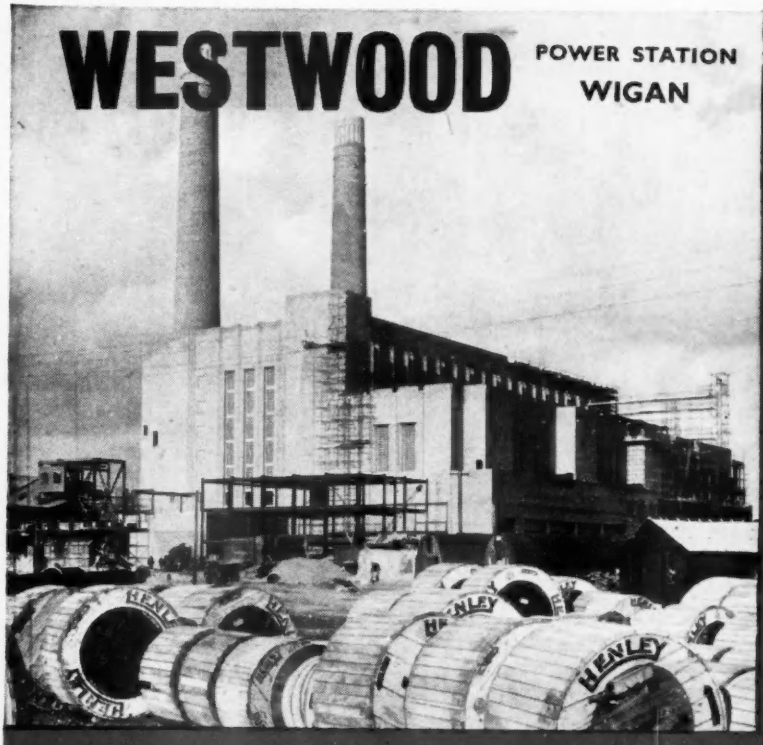
ELECTRICAL TIMES

THURSDAY
24 JAN. 1952
NINEPENCE

WESTWOOD POWER STATION WIGAN



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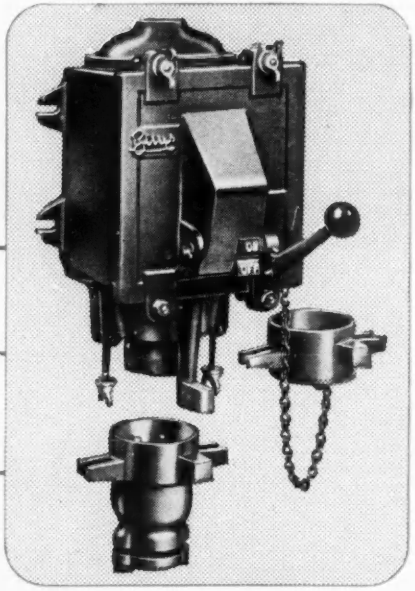

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'ENGLISH ELECTRIC'

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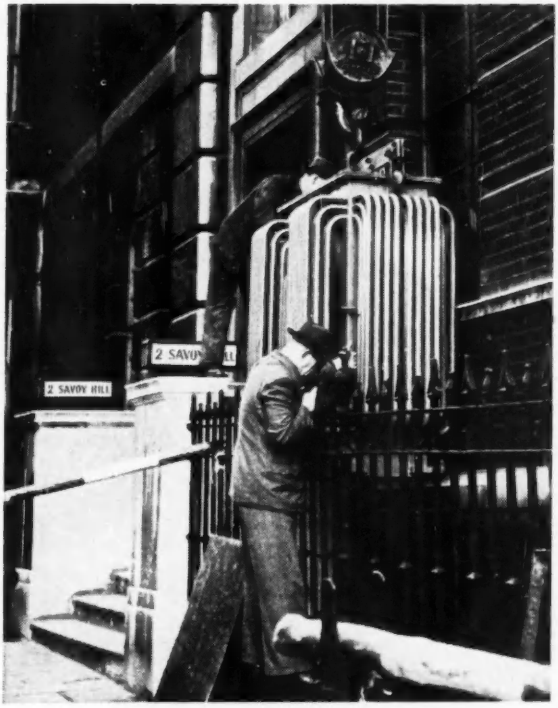

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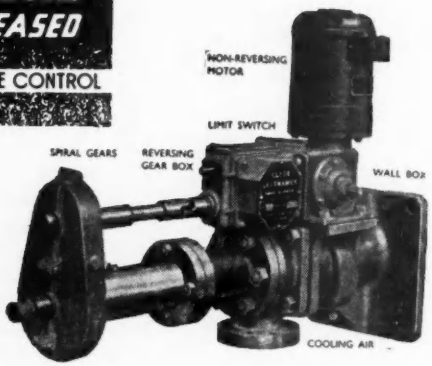

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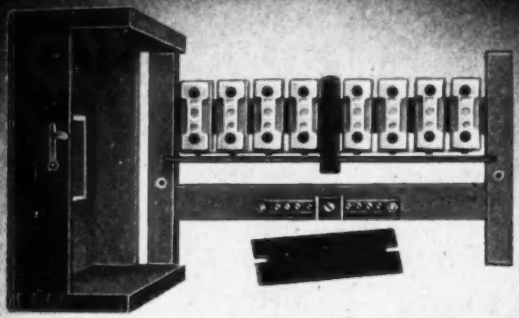

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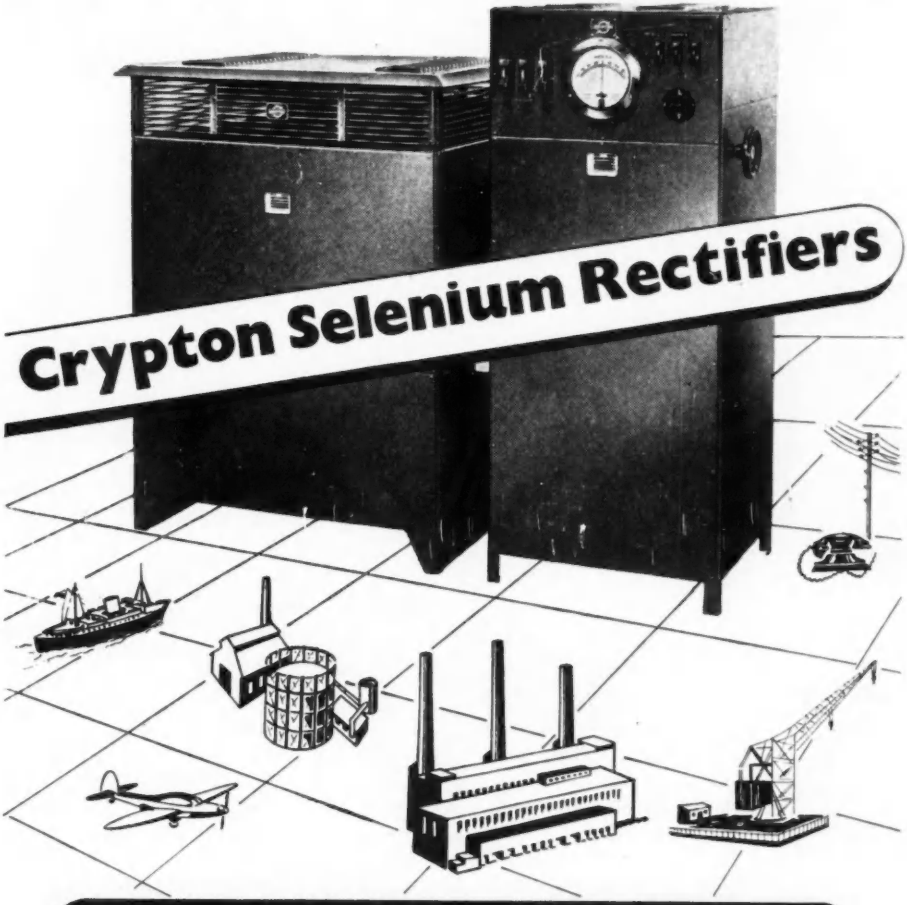

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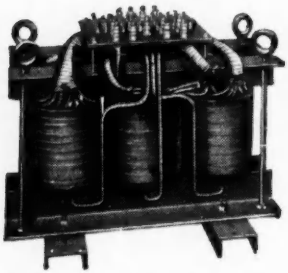

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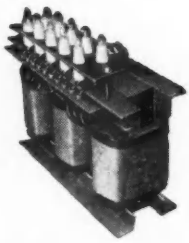

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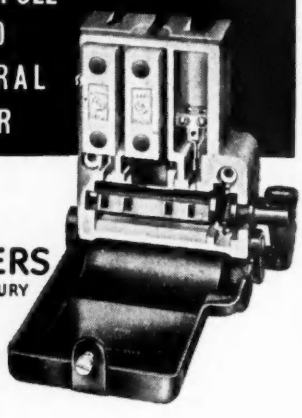

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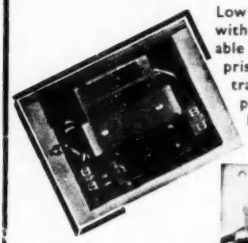

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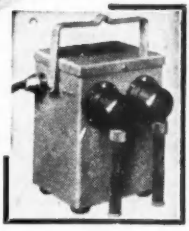

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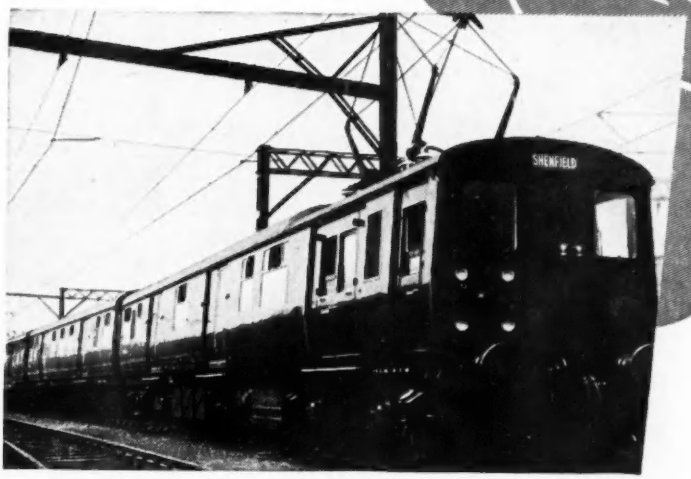

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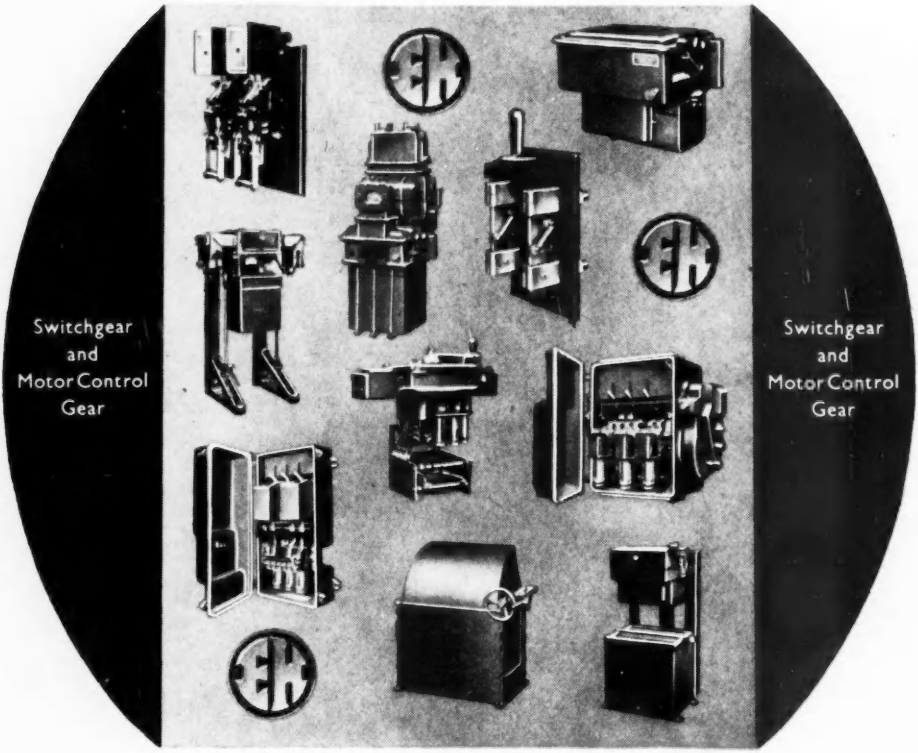

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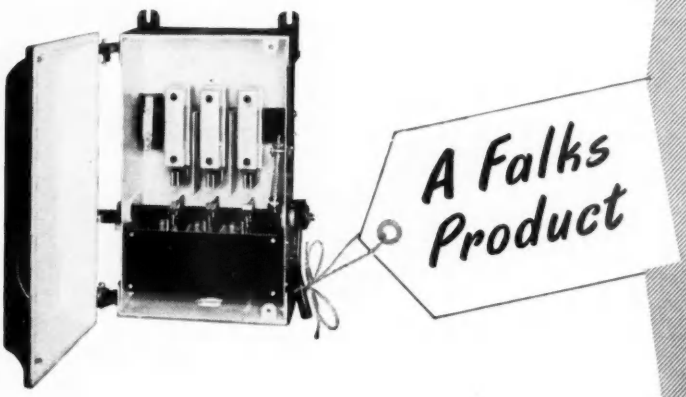

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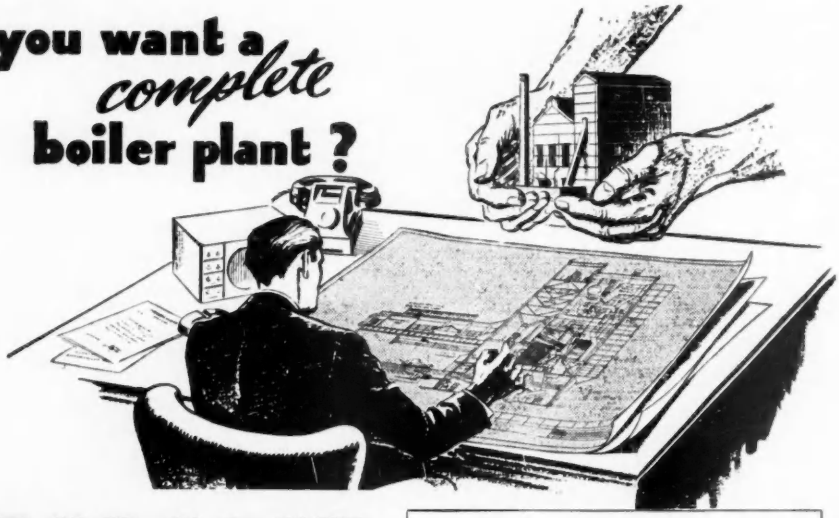

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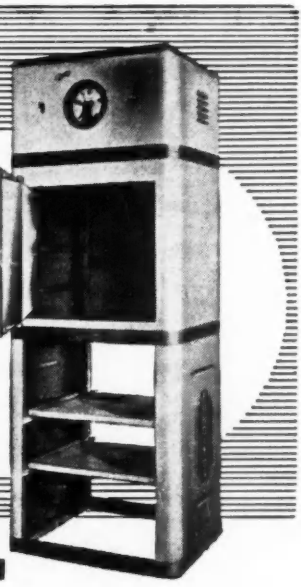

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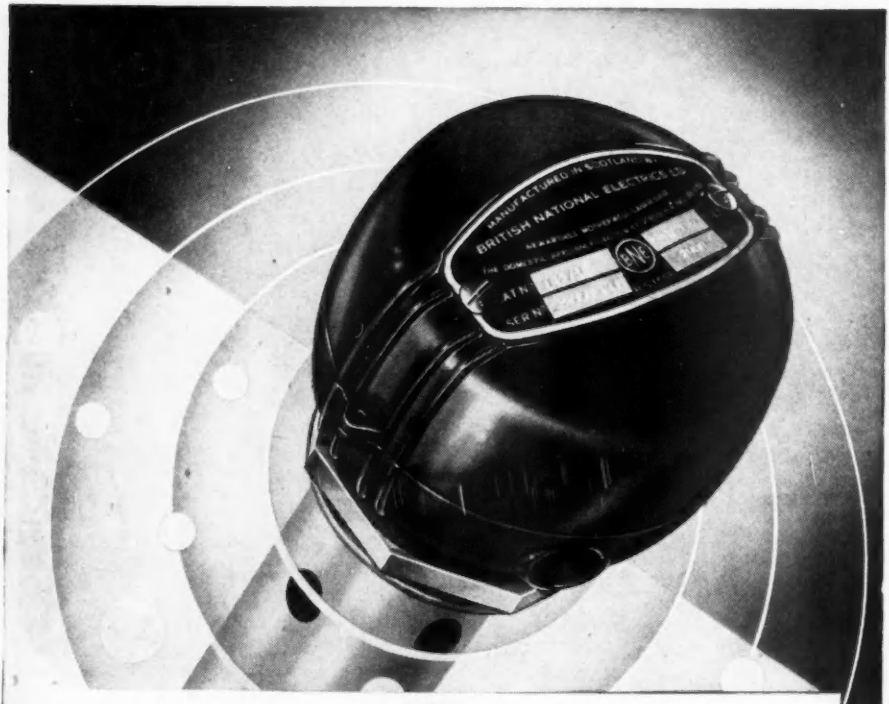

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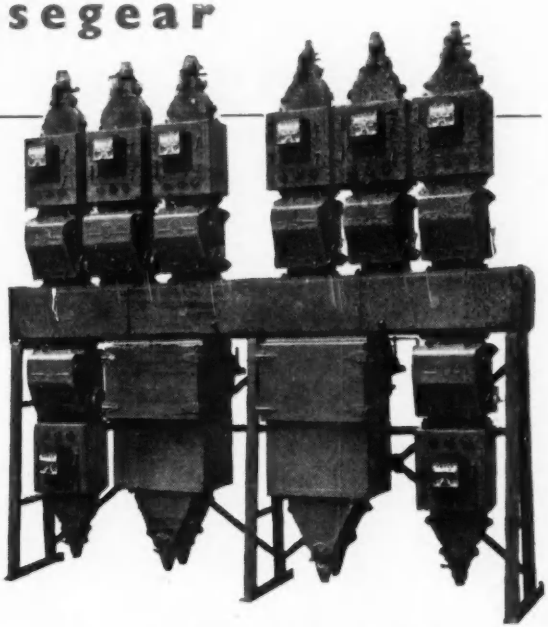

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The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works: East Lancashire Road, Liverpool 10

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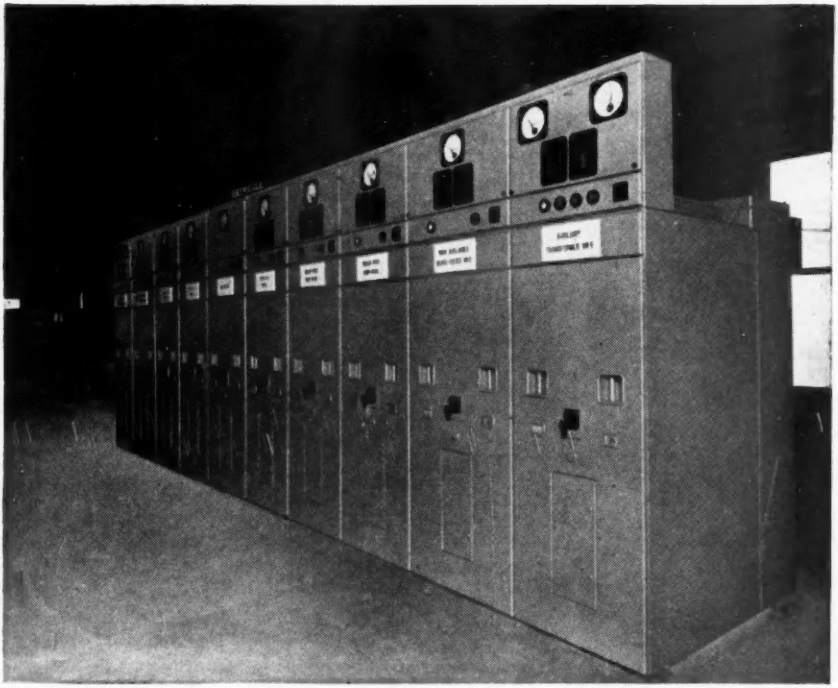
F.2

★ *If you want to talk switchgear . . . . talk to Reyrolle*



AIR-BREAK SWITCHGEAR AT CLYDESMILL

At Clydesmill Power Station, Reyrolle 150 MVA 3·3 kV air-break switchgear has been installed for controlling the power station auxiliaries. The panels are of air-insulated metal-enclosed construction with 150 MVA magnet-operated circuit-breakers. The circuit-breakers are isolated for maintenance and inspection on integral carriages and as they have easily removable arc-chutes, the whole contact assembly is readily examined. Particular care has been taken in designing the exterior and the result has been panels of neat and clean appearance.

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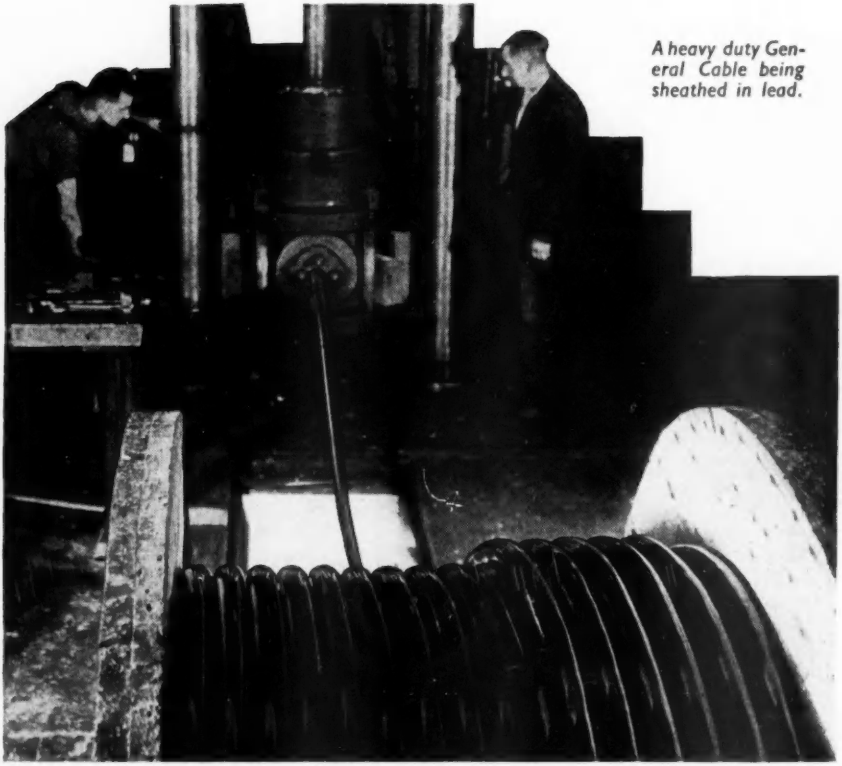

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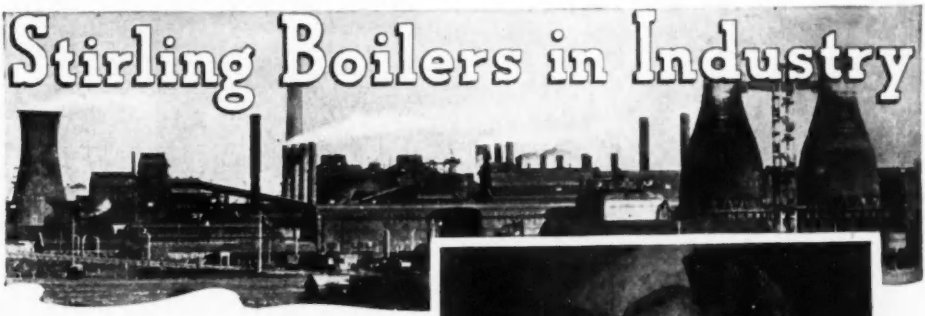
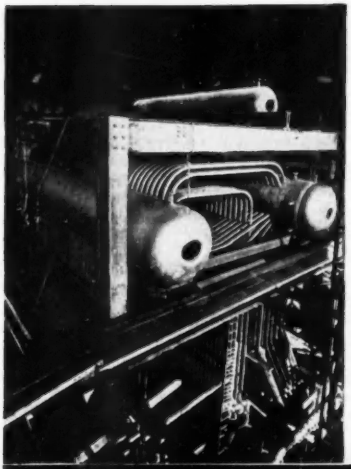
Stirling Boilers in Industry



The Alchemist...

The ancient alchemist, seeking in his puny furnaces and crude alembics, for the Elixir of Life or the Philosopher's Stone, quaint though he appears against the mighty background of modern chemistry, was probably one of the earliest users of steam for chemical processes.

"The Alchemist", by Ostare (Adriaen Janz Van). Reproduced by courtesy of the Trustees, The National Gallery, London



Modern chemical industry is now one of the largest users of steam both for process purposes and power generation, as typified by the great organisation of Imperial Chemical Industries Ltd., whose works at Billingham are being equipped with three Stirling High Duty Tri-Drum boilers, each rated at 330,700 lb./hr. M.C.R., at 765 lb./sq. in. and 815° F., to supply both generating plant and process steam requirements. These boilers, which are amongst the largest in Great Britain for industrial purposes are pulverised-fuel fired on the unit system, each having three type "E" pulverising mills feeding triple port intertube burners.

The illustration, left, shows the steam drums and receiver of one of the boilers during erection. Height to receiver drum from ground level, 93 feet

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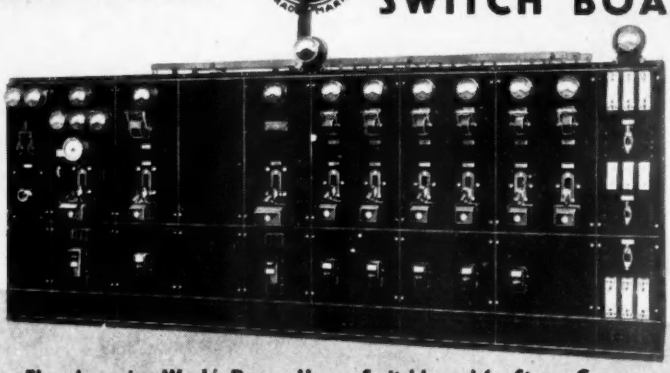

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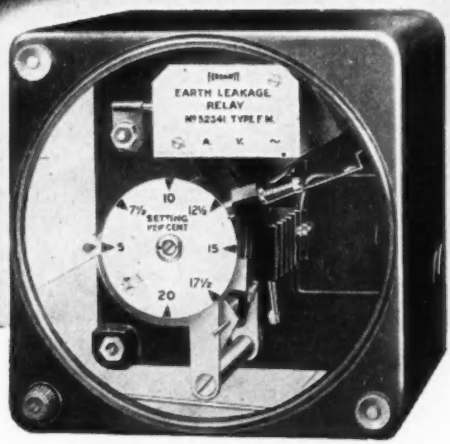

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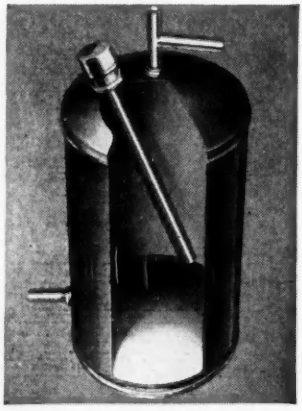

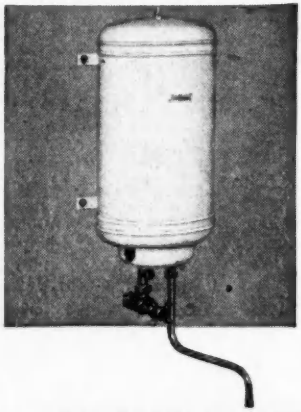

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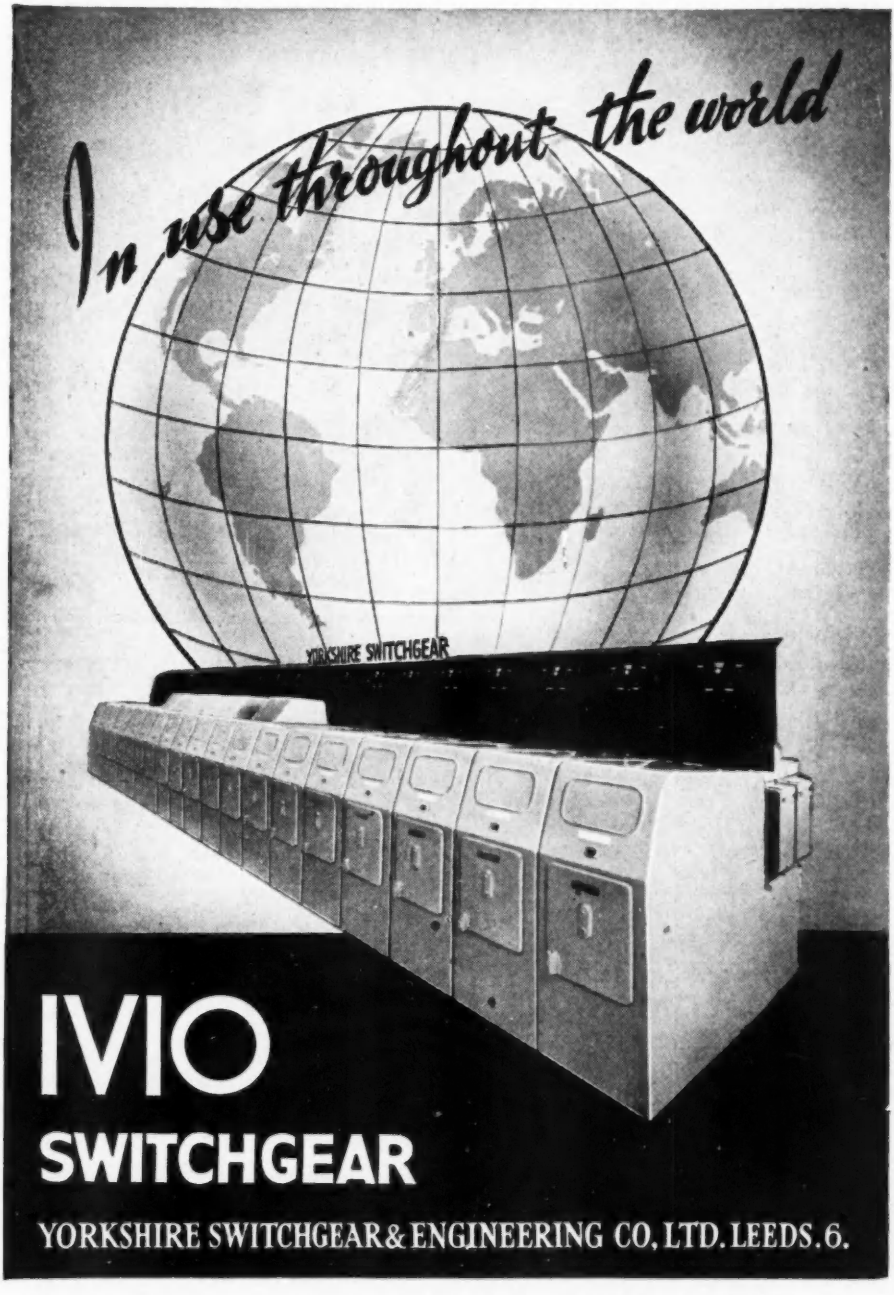

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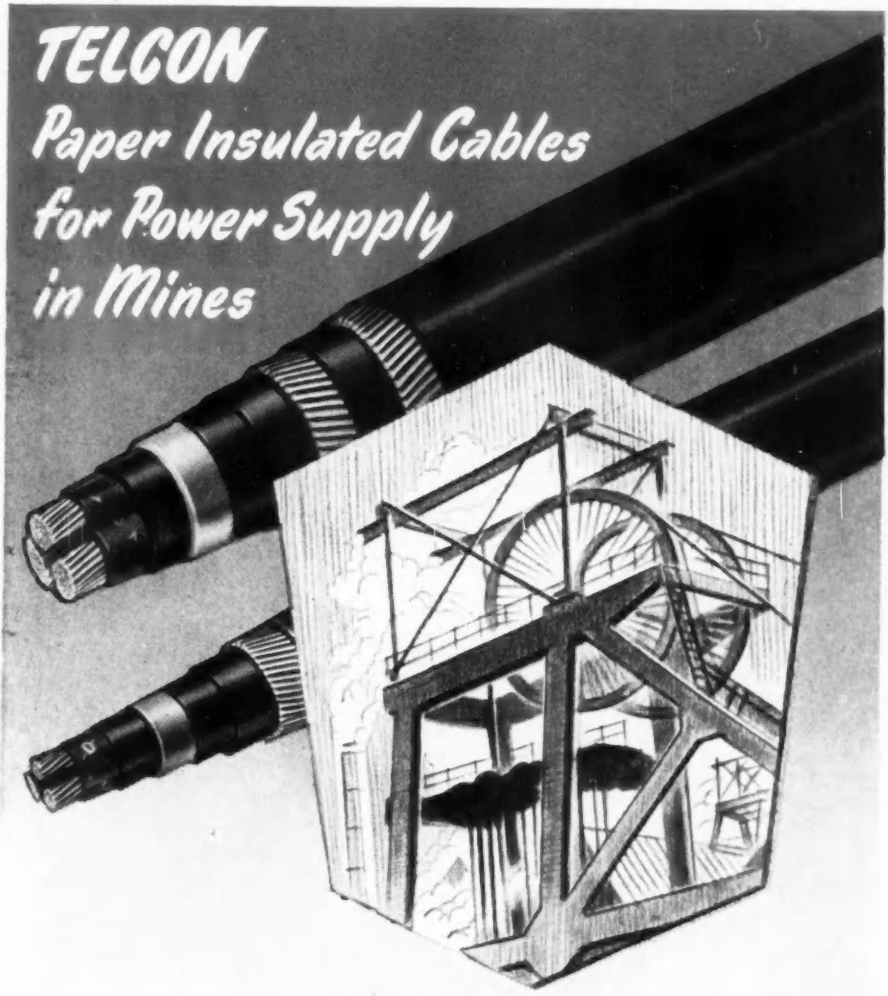

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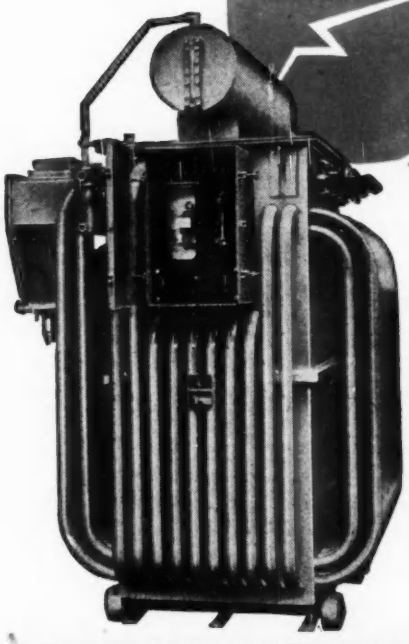

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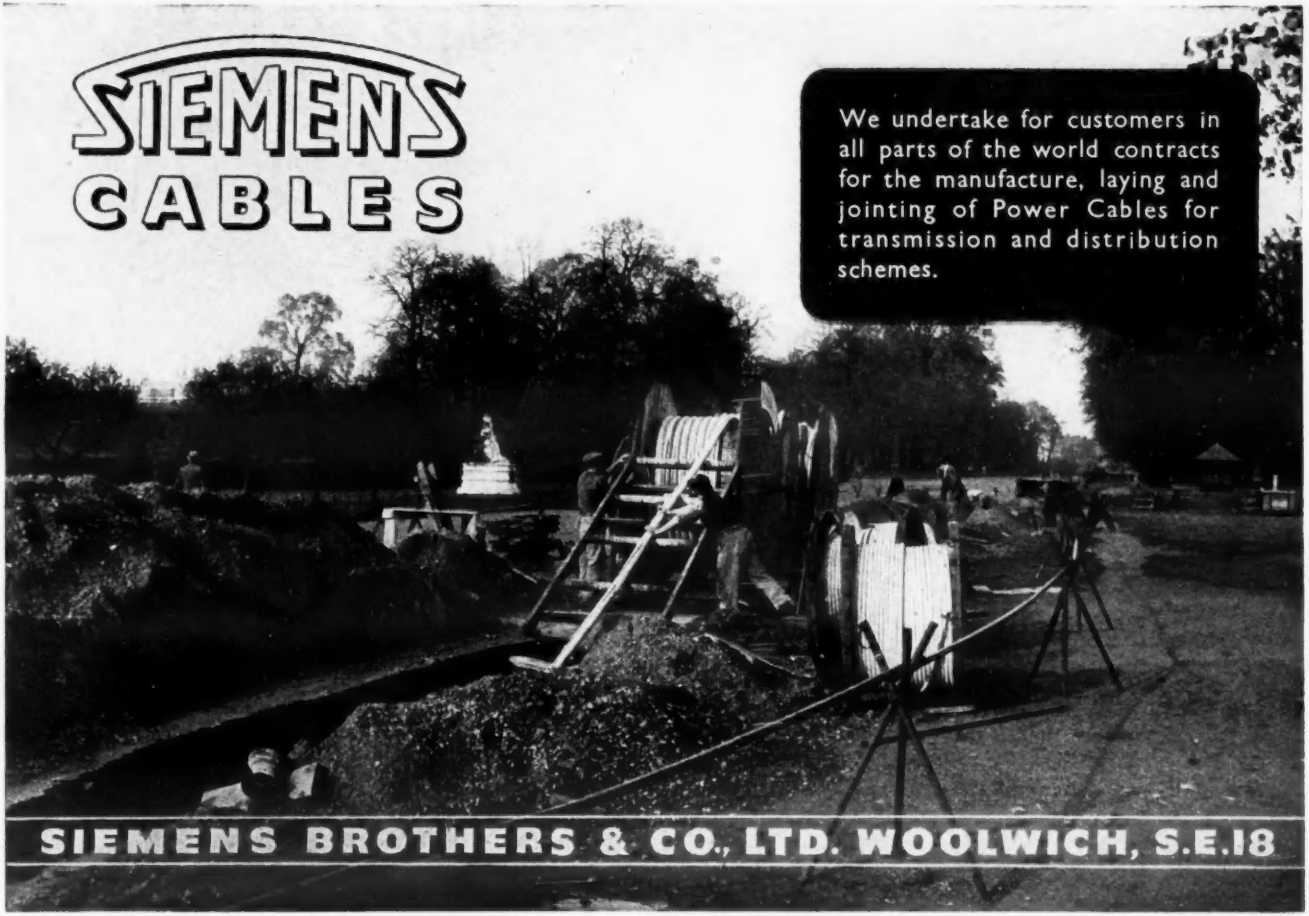
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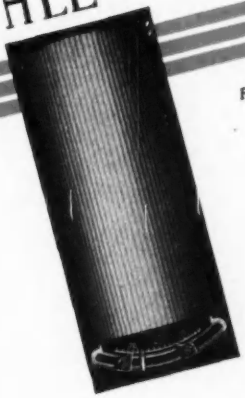
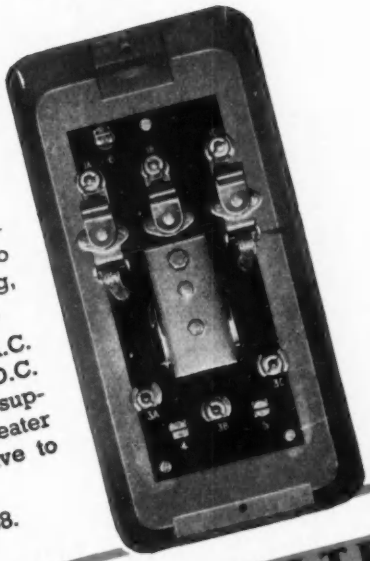


Room thermostat type "Q" capacity 15 amps A.C.



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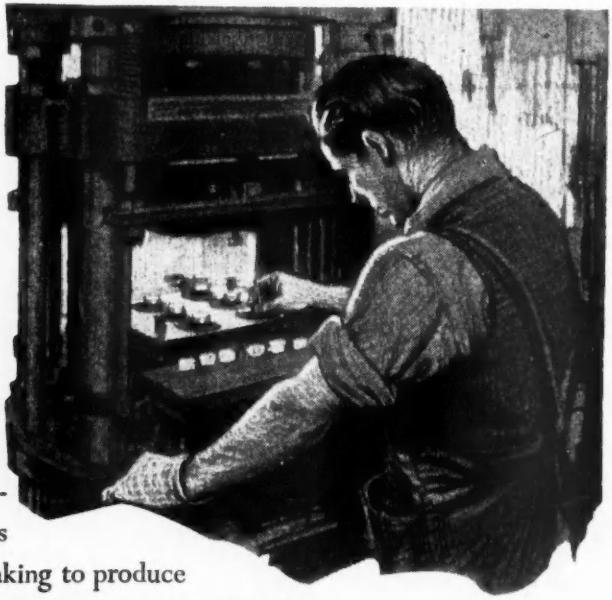

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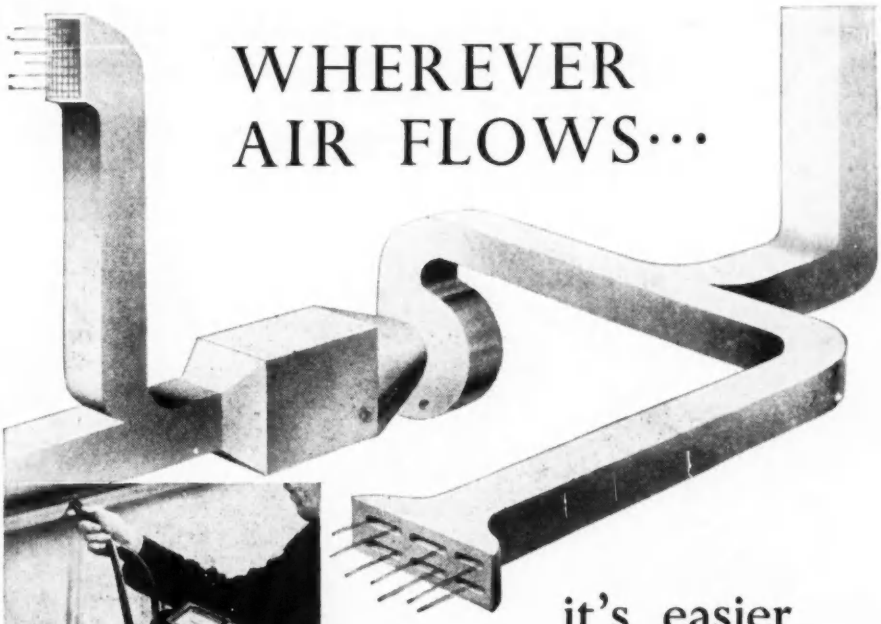

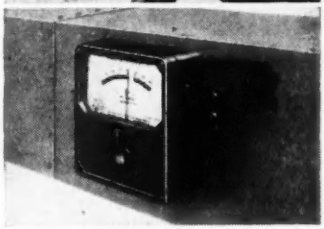

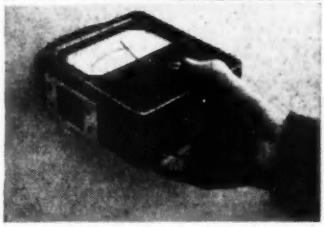

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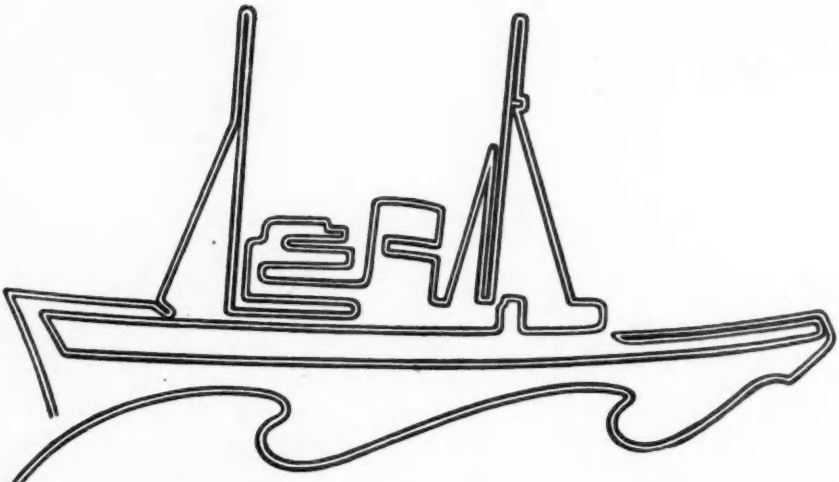

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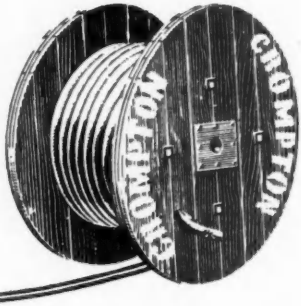

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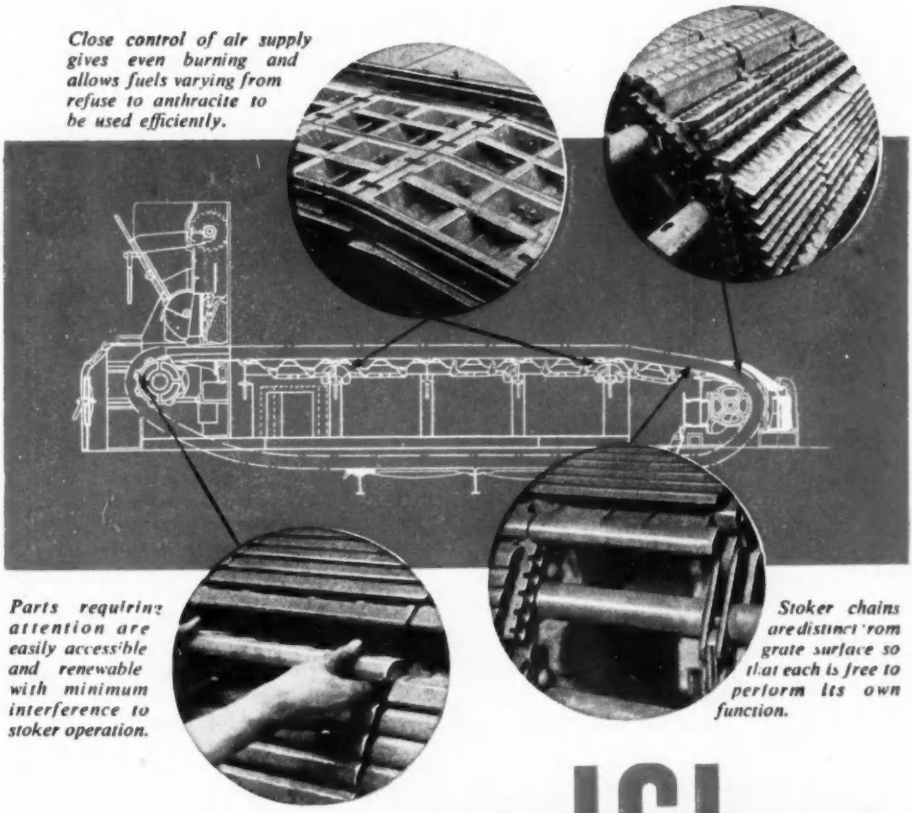

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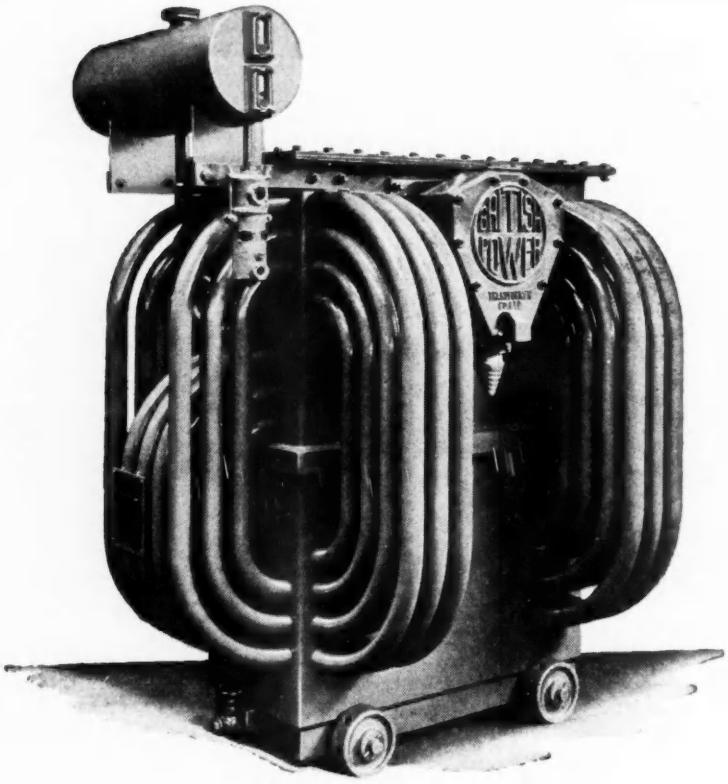

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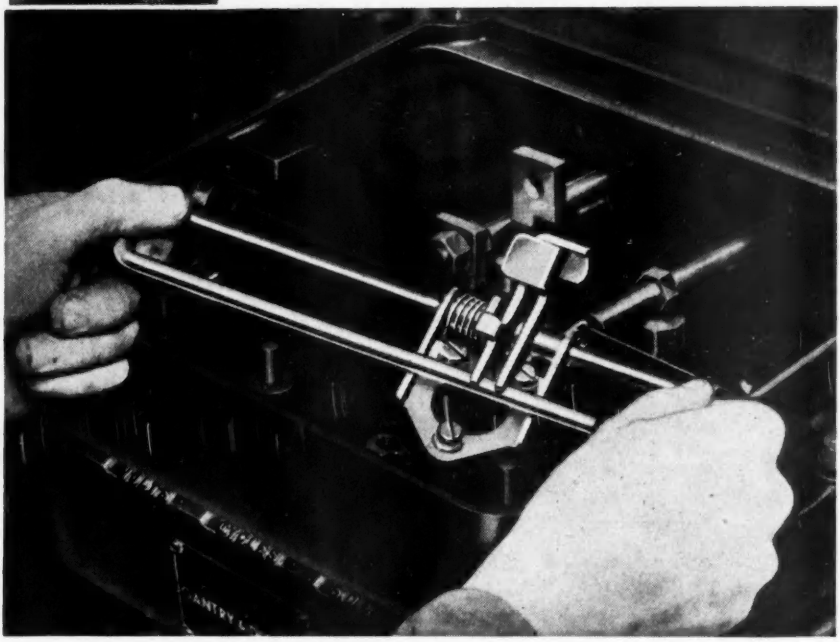

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ELECTRICAL TIMES

Vol. 121 No. 3142 THURSDAY, 24 JANUARY 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

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Editorial

RULES FOR THE ROAD

ROAD safety is so much in the public mind at present that the appearance of a Code of Practice on street lighting has an added importance. Good lighting on the roads can be an important factor in securing that reduction in number of accidents that everyone desires, but quality in lighting is more than a simple matter of minimum lumens and candle-power. The Code—belated development of a recommendation made by a Ministry of Transport Committee in 1937—is careful to recognise this explicitly. As is necessary with an art, no strict rules are laid down, and plenty of scope is left for the skill of the illuminating engineer to produce a solution to particular problems that arise. The main value of the Code lies in the leading principles it presents: these may help to secure in time some continuity of treatment in road lighting. If the variation of illumination standards along successive stretches of a road, so confusing to the motorist and fraught with danger for the road-crossing pedestrian, can be finally eliminated, a very real advance will have been made in the cause of safety on the road. Existing installations need to be examined against the principles proposed in the Code, as well as new plans checked for compliance with it: no doubt replacement of many will be found necessary, though it will doubtlessly be pleaded that economic circumstances preclude early correction of the position.

ORDER EARLY

ANY expansion plan involving the installation of plant depends in the last resort on the availability of manufacturing capacity and materials. It is not surprising, then, that the Organisation for European Economic Co-operation, whose five-year plan for a 25% increase in the production of member countries has been mentioned here before, should keep a close watch on Europe's ability to produce power station plant. The latest of the half-yearly surveys which are published as a result of these investigations discusses the position at the beginning of July last, before the full effects of materials shortages began to be felt. Western European production potential, it is concluded, is steadily increasing to a level, to be reached in 1954, at which some 14,000 MW of plant can be supplied yearly for use in Europe after allowing a further 3,500 MW for export to other continents. There is one difficulty about using this capacity to the full, however: early ordering is necessary, particularly for boilers, and this is not always forthcoming. Probably these strictures do not apply to this country, where planning four to six years ahead is the rule, and delivery periods of 24 to 30 months are quoted for turbo-alternators, and 24 to 42 for boilers, but in the general picture of European productivity the problem is an important one. One further warning is quite properly given in the report: the 14,000 MW capacity quoted does not mean that this increase in installed plant can be expected. Most countries are planning extensive replacement to improve thermal efficiency.

CARE OF THE CONSUMER

THERE is some divergence of views on how unsafe electrical installations become as they age, though there is general agreement that they do deteriorate. Assuming that some increased degree of risk does attach to those veteran installations of over forty years life, there is then a question of what can be done to make them safe, short of the usually impracticable solution of complete re-wiring. Mr. H. W. Swann, abandoning his usual factory interests to give his experience to the domestic consumer, dis-

cussed this point in a paper at the I.E.E. last week. Large scale inspection as an answer he dismissed: added to the practical difficulties it presents, there is the damning objection that it usually harms old and brittle wiring, and often leaves it in a more dangerous condition. The solution may lie in more attention to the automatic protection of the installation, with the provision of something more sensitive than a fuse to take care of leakage currents with their associated shock and fire risks. More sensitive, however, usually implies more complicated, and experience leaves no room for confidence that the consumer can be trusted to ensure that complicated gear keeps in working order. So there follows from Mr. Swann's suggestion, as he well recognises, the idea that electricity boards should accept a new responsibility for the protection of consumers' installations. Something of this nature has already been undertaken on a limited scale where earth leakage circuit-breakers are installed, some boards arranging for their staff to undertake periodic maintenance. Important legal considerations are involved, however, while the problem of cost would no doubt cause some discussion.

WARNING WANTED

IT was not only in the main paper of this I.E.E. meeting that earth leakage circuit-breakers were mentioned. Unheralded by any public announcement before the evening, and unsupported by printed copies available for study, came the summary of a further paper by another member of the Factory Inspectorate. This time an old controversy in the application of earth leakage circuit-breakers was raised: whether a solid earth connection should be used in installations where the voltage operated type of e.l.c.b. is fitted? The underlying suggestion was that detailed studies of the problem, combined with some not altogether satisfactory experience with e.l.c.b.'s (maintenance is a relevant factor) justified a reversal of accepted practice, even though this might involve some modification in circuit-breaker construction. Not unnaturally, those advocates of voltage-operated e.l.c.b.'s who had come to speak on Mr. Swann's paper felt bound to comment on this unexpected contribution to their subject, and since the brief survey possible in the time allocated had given them little opportunity of appreciating the subtleties of the argument, they were mainly hostile. This was unfortunate, for it does seem to *Meteor* that the ideas put forward are worthy of more careful consideration. If this paper is going to be considered when Mr. Swann's is presented at the various Local Centres of the Institution, then it will help both audience and author if some printed summary of it is made available before the meeting.

THE OTHER FOOT

THE force of that last gale of price increases from the National Coal Board was tempered for the electricity supply industry by adjustments taking account of the low grade of most power station fuel. For the gas boards, however, this step so proudly recorded as rationalisation by the N.C.B., made the increases a very ill wind. Faced with the prospect of paying above the average increase in recognition of the quality and the calories they receive, the gas industry is raising the ugly cry of "discrimination." A more notable case of seeing things upside down has not come *Meteor's* way for a long time. The gas industry would be very unhappy if it had to burn the poor grade coal that is used so successfully in electricity power stations. Yet electricity supply has for many years received a proportionately reduced reward for using such comparatively unwanted fuel, because flat-rate increases in coal prices have been imposed. In effect, the electricity supply industry has been subsidising the gas undertakings, along with other users of good quality coal. Now that the situation is being in some degree corrected, the gas interests are quick to smell injustice, having grown comfortably used to their artificially favoured position. They find that the boot shifted to the other foot is surprisingly painful.

Meteor

Electrolytic Field Analysis

The further application of this technique to the Design of High Voltage Circuit-breakers

By E. G. WILLIAMS,
A.S.T.C., Grad.I.E.E., Jnr.I.E. (Aust.), A.M.A.I.E.E.

DETAILED electrostatic field analyses can represent a formidable design problem involving a considerable amount of development work. Use of an electrolytic field analysis technique by A. Reyrolle and Co. Ltd. of Hebburn has, however, yielded very satisfactory results.

An electrolytic method for determining the maximum voltage across one interrupter head of a multi-break design has already been described in the ELECTRICAL TIMES*

It was the object of the present analysis to determine the stress distribution in the interrupter head insulation caused by the application of this maximum voltage.

Principle of Operation

The principle adopted is the same as that described by Peplow, except that a wedge-shaped model technique is employed. The essential features of this technique are that symmetrical three-dimensional fields can be analysed with a two-dimensional analyser and numerous insulations having different dielectric constants can be readily represented.

Figs. 2(a) and 2(b) illustrate the principle of the wedge-shaped model technique. A wedge of conducting material is made geometrically similar to an axial wedge of the actual arrangement (in this case a sphere gap surrounded by an insulating cylinder). Change of dielectric constant is then represented by a change in conductance. Since it is convenient to use an electrolyte having a uniform resistivity the change of conductance is obtained by a change in electrolyte depth and this is geometrically related to the wedge angles. Hence the channel simulating the presence of the insulating cylinder has a wedge angle of $K\theta$, where K is the dielectric constant (S.I.C.) of the cylinder and θ is the angle of the wedge representing the other insulation, i.e. the surrounding air.

The current distribution created in the electrolyte when a voltage is applied across the electrodes representing the spheres, is the same in direction and relative magnitude, as the electrostatic flux distribution in the actual arrangement.

This means that the fields are identical, and by plotting the equi-potential lines in the electrolytic analogue one obtains the position of the equi-potential lines in any one axial plane of the arrangement being analysed.

Of course, these equi-potential lines have to be revolved around the axis of symmetry to generate the actual equi-potential surfaces which exist in three-dimensional fields.

Model Manufacture

Fig. 1(b) shows the wedge-shaped model used for the analysis. It was milled from a wooden block using scale drawings as templates. As can be seen from comparison with Fig. 5, the electrolyte in the model represents a wedge-shaped portion of the actual interrupter head

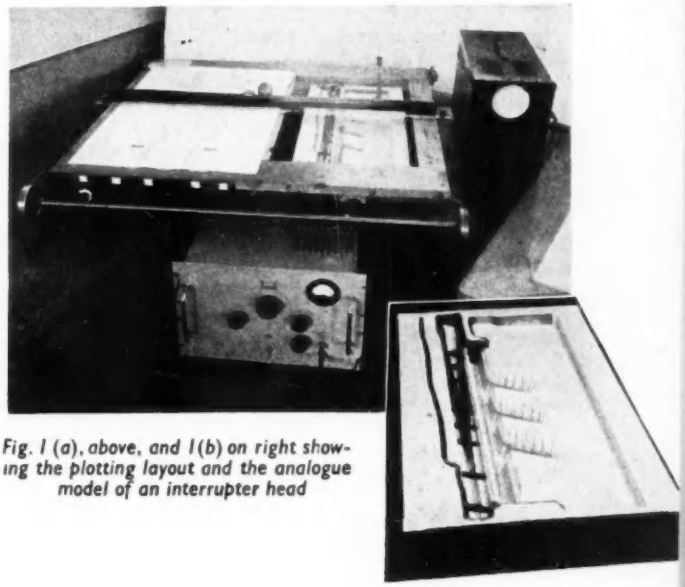
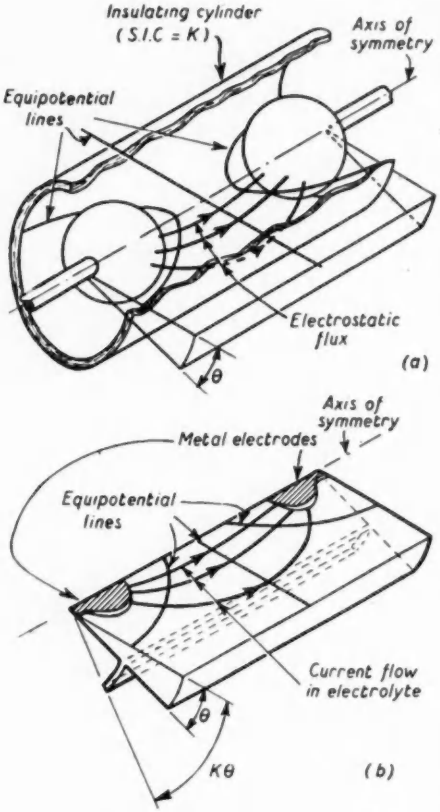


Fig. 1 (a), above, and 1(b) on right showing the plotting layout and the analogue model of an interrupter head

* Peplow, M. E.: "Plotting Voltage Gradients" ELECTRICAL TIMES, February 15, 1951, Vol. 119, p. 256.



[Fig. 2 (a) and (b). Diagrams showing the technique adopted

arrangement, the axis of symmetry being parallel to the left hand-side of the wooden block. The bottom of the area representing air was milled at an angle of 3° to the designed electrolyte level, and the channels representing bakelised paper and porcelain were milled at 13·2° and 18° respectively. That is, in direct proportion to the ratio between the dielectric constants of these insulations and that of air.

The pins at the edges of the channels are used to ensure an abrupt change of electrolyte conductance (simulating an abrupt change of dielectric constant in the actual interrupter head). By curving these "transition pins" the error due to the straight milled channel edges was reduced to negligible proportions. The material used for these pins was tin-plated steel wire, enabling them to be driven into position.

The condenser foils in the cylindrical bakelised paper insulator were represented by tinned copper strips positioned by glass pins inserted into support blocks.

Metal surfaces were produced where required by spraying copper on to the wood after milling. These surfaces were then "tinned" to render them non-porous. The metal surface at the left-hand side of the model represents the central contact stem, and that at the top represents the surface of the metal head of the interrupter.

The rest of the model is then waterproofed by cellulose spraying.

Field Plotting

The model was positioned in the analyser as shown in Fig. 1(a) so that the equi-potential points could be directly transferred to a drawing of the interrupter head.

The model was filled to the designed level with distilled water containing slight amounts of ammonia and a degreasing agent.

Due to the menisci formed between the "condenser foils" they would not take up their designed potentials. These potentials, based on a practically uniform voltage distribution, were imposed on the foils in the model by a voltage divider.

A 1,000 cycle supply, from the beat frequency oscillator shown in Fig. 3, was applied to the model across the two metal surfaces representing the central contact stem and the upper portion of the interrupter head.

The load taken by the model, excluding the voltage divider, is about 30 milliamps at 15 volts. This load is closely related to the sensitivity of the detection method used in the location of the equi-potentials. The basic circuit for the analyser is shown in Fig. 4. The

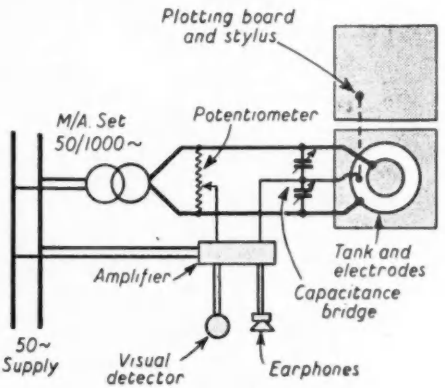


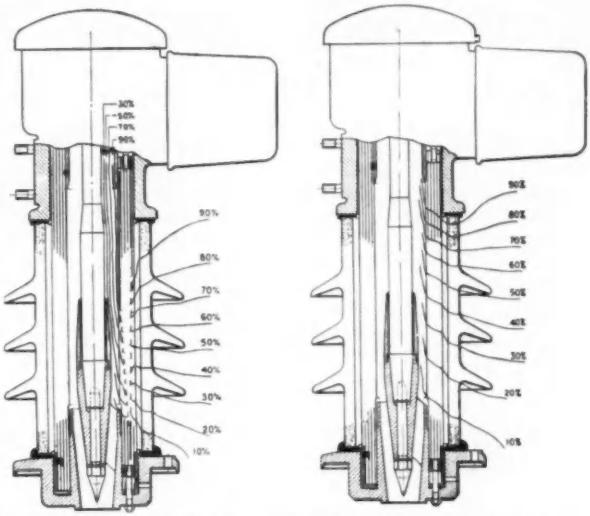
Fig. 3. Method of connection for plotting

capacitance bridge is used to balance out capacitance effects in the electrolyte enabling an equi-potential point in the model to be balanced against a calibrated resistance potentiometer.

The oscilloscope shown in Fig. 1(a) was used as the null detector in this case, and was most satisfactory. The actual plotting of the complete field of the interrupter only took a few hours due to the accurate positioning possible.

Results

The field plotted on the right-hand side of the interrupter head shown in Fig. 4(a) was the result of the analysis described above. Only the position of the ends of the foils in the bakelised paper insulator are shown. These foils are arranged in a double echelon.



Figures 4(a) and 4(b) show a comparison of the stress distribution with and without condenser foils

From this field plot the maximum stresses in each insulation could be obtained and compared with the dielectric strength of that insulation. High stresses occur in the compressed air chamber where they are easily withstood. Externally the stress distribution is very even, due mainly to the influence of the condenser foils in the bakelised paper insulator.

To show this fact more clearly an analysis was made with the condenser foils removed entirely. The resultant field is shown in Fig. 4(b) and from this it can be seen that the stresses are substantially increased particularly those external to the porcelain. This fact is very important since a fundamental of air-blast interrupter head design is that the gap in the arcing chamber must be the weakest point electrically.

This particular application of a practical electrolytic field analysis technique is indicative of the growing importance of this approach to high-voltage equipment design.

Mechanical Rectifier for 10,000 Amps

RECENTLY introduced by the I.T.E. Circuit Breaker Co., Philadelphia, Pennsylvania, is a mechanical rectifier capable of delivering 10,000 amps with a performance claimed to be superior to other types of converting plant. This type of rectifier was originally developed in Germany.

In operation, the convertor makes metallic contact between an appropriate phase of the a.c. supply from the rectifier transformer and the associated d.c. system. This connection is arranged to take place during the period when the a.c. supply is at the desired polarity. When the polarity reverses the contact is broken, the system being such as to synchronise these make-and-break operations.

In order to obtain continuous current, it is a requirement that a new phase must be connected before the contact with the previous phase is broken. While both phases are connected, a short-circuit current flows, which forces the current of the first phase to zero. At this instant the first phase contact is broken and the second phase is connected to the load. To reduce arcing on this switchover, a saturable reactor is incorporated, having core of nickel-iron. The effect of the reactor is to modify the sine wave in such a way that a short "step" is produced in the curve at zero current with each change of polarity. This time lag is long enough to enable a set of synchronously driven contacts to make and break connection with succeeding phases at essentially zero value, thereby avoiding breaking the heavy current.

SAFETY IN THE HOME

Earthing and Fire Risk in Domestic Installations discussed

SAFETY aspects of domestic electrical installations provided a subject for the meeting last Thursday of the I.E.E. Utilisation Section, and allowed MR. H. W. SWANN, O.B.E., M.I.E.E. (Senior Electrical Inspector of Factories) ample scope for emphasising some important principles.

He began his paper with a consideration of fire statistics, showing that in recent years electricity has accounted for 16 to 17% of all fires in buildings. Though the percentage is low, there is the danger that it may rise due to the effects of age and wear and tear on installations. This point is emphasised by the results

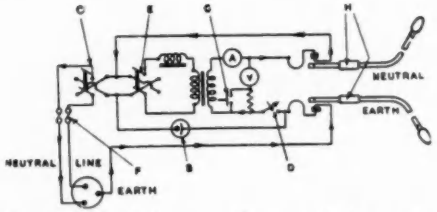


Fig. 1. Circuit diagram of an earth loop tester
A = ammeter, B = neon indicator, C = main switch, D = test switch, E = polarity switch, F = supply fuses, G = push for lower scale of voltmeter, H = jack plugs

shown in Table 1, which were obtained when installations in a large town were tested by a team under the direction of a technical officer.

Table 1. Results of Installation Tests

Year	1947	1948	To July 1949	Total
Inspections	6,200	4,943	2,652	13,795
Defective installations	3,600	1,200	670	5,470

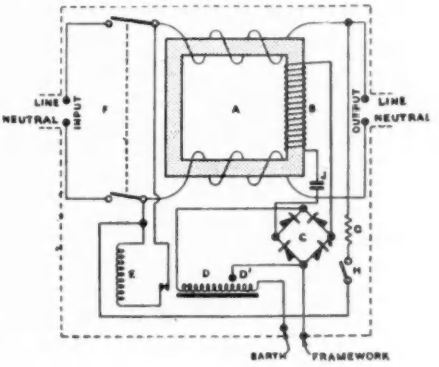
Inspection and test of an old installation in use is no simple matter, even preparations for the test being difficult to make without causing inconvenience to the occupants of the building concerned. One of the first difficulties met after this stage is the determination of the carrying capacity of cables. Leakage current, required by Electricity Regulation 26 to be less than one ten-thousandth of the maximum current is also difficult to measure, because of capacitance effects. If low insulation resistance is found, tracing the bad spots is most difficult.

Tests on old vulcanised rubber insulation show that although brittle, the insulation is usually effective while dry, but the least moisture causes failure. If disturbed, the insulation may go to powder; the weakest spots appear to be behind switches, ceiling roses and wall sockets.

For many purposes a loop tester is of value, and one type is shown in the illustration. The use of such an instrument makes possible the calculation of the maximum earth leakage current that can flow when insulation breaks down, and its relation to the settings of main, sub-main and sub-circuit fuses. I.E.E. wiring regulations deal only with the resistance of the part of the earth path which is situated on the consumer's premises. Such factors as greater demand, leading to higher settings of main overload protection, and the use of non-conducting water pipes, nowadays make it unsafe to assume that the resistance of the remainder of the earth circuit will be very low. The possibility exists, suggested Mr. Swann, that a civil court might hold the Supply Undertaking responsible for conditions of high transformer earth-connection resistance which nullified the protection to be expected from the consumer's fuses. A position that complicates matters here is that the Electricity Regulations, while forbidding the insertion of resistance in the transformer neutral/earth connections, do not say that it should be taken out if it got there without being "inserted."

One method of attacking the problem of high resistance at the transformer neutral is to omit the earth connection there, and rely on a

Fig. 2. Combined differential current and voltage-operated circuit-breaker
A = transformer, B = secondary winding, C = metal rectifier, D = d.c. relay, D¹ = relay for voltage protection, E = switch trip coil, F = double-pole switch, G = test resistor, H = test key, J = capacitor



number of connections between the neutral and earth at consumer's premises. This, of course, is a variant of protective multiple earthing.

Earth Leakage Protection

Although earth leakage protection by voltage-operated c.b.s is well established, there is an argument for adding a current-balance or differential feature in addition. Up till now, however, a suitable c.b. has not been available at "a reasonable price." A possible design, developed specially for the protection of domestic installations, is shown in Fig. 2. The differential feature of such a c.b. would be particularly valuable in removing the risk of fire due to sustained leakage with only a low voltage rise on earthed metalwork.

Any discussion of earth leakage c.b.s raises the question of cost. The cost of earthing the neutral of a supply system, and of providing such safeguards as multiple earthing of the neutral and aerial earth wires where deemed necessary is borne by the supply undertakings. Where the consumer cannot obtain a low enough earth resistance for his own part of the earth circuit, he usually pays for the necessary apparatus to make the system safe in spite of this. Where the resistance is concentrated at the undertaking's neutral/earth connection, the position is not so clear: it may be decided that the question of cost should be decided on a basis of respective earth resistances, as determined by loop test. Maintenance of earth leakage c.b.s raises another difficult problem; consumers too easily neglect the necessary occasional pressing of the test button. Perhaps area board visiting staff should give assistance here, but this may imply acceptance of responsibility.

Another form of protection on which reliance is being placed to an increasing extent is that provided by temperature-sensitive devices. Built into motors and other appliances, such units can be made sensitive both to load current and to frame temperature rise. Accurate calibration of bimetallic combinations for this purpose can be achieved to within 2° F, and valuable protection afforded.

After Mr. Swann had read his paper, the chairman announced that Mr. N. Elliott, A.M.I.E.E. (Factory Inspectorate), had written a paper entitled "Earth Leakage Protection in Parallel with a Solid Earth" for publication in the "Proceedings." He then invited Mr. Elliott to present a summary of this paper.

Mr. Elliott said that his investigations into this subject were doubly appropriate to the discussions because, in addition to their general relevance, they were based on an idea of Mr. Swann's. In the method of protection he intended to discuss, the apparatus or frame to be protected was connected to a solid earth electrode and also, via the trip coil of a voltage-operated e.l.c.b., to an auxiliary earth electrode, so spaced from the main electrode that there is no overlapping of their resistance areas. In the normal application of the voltage-operated e.l.c.b., there was, of course, no direct connection of frame to earth, the fine-wire trip coil being interposed.

The argument in favour of parallel earth-leakage protection took the form that it was better to ensure that the apparatus was properly earthed by a solid earth connection, and use a parallel-connected trip to give appropriate sensitivity, than to use a "solo" connected trip

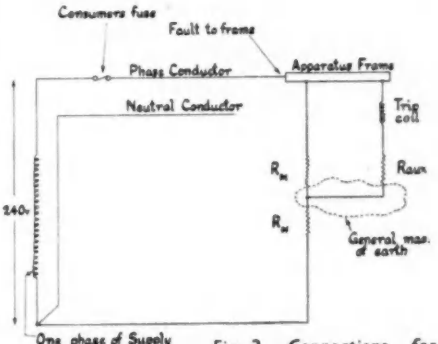


Fig. 3. Connections for parallel-connected e.l.c.b.

and leave fortuitous earthing to chance. It had to be remembered that the voltage to earth of protected frames was not, as often imagined, limited to 40 V, as was often assumed on a basis of B.S. 842 test voltages; the resistance of the connection to earth affected the value. Also experience with e.l.c.b. reliability had not been uniformly satisfactory.

If the resistance to earth at the supply transformer neutral were R_N, at the consumer's main earth R_M, and at the e.l.c.b. trip coil connection R_{AUX}, then for ordinary earthing the condition for a fuse to blow on a phase/neutral solid fault was that $\frac{V}{R_N + R_M}$ should exceed minimum fusing current of the circuit fuse. Similarly for a trip to operate with a given value of trip-coil impedance and R_{AUX}, $\frac{R_N}{R_M}$ must not exceed some limiting value.

The question arose, what was a suitable trip-coil operating current? If trips with (i) 25 mA and (ii) 65 mA minimum operating

currents were investigated, assuming a coil impedance of 180 ohms, curves of $\frac{R_N}{R_M}$ against R_{AUX} were found to be roughly hyperbolic, representative values being $R_{AUX}=2{,}000$ ohms, (i) 4, (ii) 1; $R_{AUX}=1{,}000$ ohms, (i) 6, (ii) 2; $R_{AUX}=500$ ohms, (i) 12, (ii) 4; $R_{AUX}=100$ ohms (i) 32, (ii) 12; R_{AUX} zero, (i) 50, (ii) 21. At values of $\frac{R_N}{R_M}$ exceeding these the trip would not operate. The importance of these ratio considerations rested on the increasing use of immersion heaters, electrically-driven pumps and other apparatus connected to water. Fortuitous earthing of the frames of such apparatus and of conduit giving a low effective value of R_M could thus take place, with operation of a "protecting" solo connected e.l.c.b. impossible. Unless tests were made to check the possibility of such an occurrence, the use of solo connected e.l.c.b.'s became a matter of hit and miss. If a trip with a 5 mA minimum operating current were used, the $\frac{R_N}{R_M}$ ratio limit was increased to nearly five times that with a 25 mA current. Such a low operating current was practicable from the cooker leakage point of view when a solid earth connection shunted the trip coil.

Summing up methods of applying earth leakage protection, Mr. Elliott mentioned first the combined differential and voltage-operated e.l.c.b. described by Mr. Swann. This had a high permissible $\frac{R_N}{R_M}$ ratio. Parallel earth leakage protection using the plain "voltage-operated" type of trip gave good reliability with a fairly high permissible $\frac{R_N}{R_M}$ ratio. Finally came the widely applied solo connected e.l.c.b. which, it was suggested, was inadequate in reliability and performance.

DISCUSSION

MR. P. V. HUNTER (Callender's Cables) commented that, on the whole, one gathered that the older installations had behaved quite well. It was important to remember that rubber mixes used in the early days of cable manufacture were different to those now offered. In particular, much attention is now given to the adding of antioxidents, and the effect should be to lengthen cable life. The fact that cables suffered most at their ends confirmed that oxidation was a major factor.

Referring to earthing problems, he suggested that reliance on relays was objectionable. It had to be remembered that if the contractor could not find a good earth, it was unlikely that the consumer would find one fortuitously.

MR. J. J. BERNARD (E.D.A.) suggested that statistics showed that shock accidents/electrical consumer had fallen to about three-fifths in the last eight years. He warned against too much unthinking attention to fire statistics; often when an electric appliance failed there was a lot of smoke, but no actual fire. None the less, the fire brigade was called. The improvements that had been made in the use of thermal protection would considerably reduce the risk of fires.

MR. H. J. GIBSON (Midlands E.B.) said it was the opinion of many people that old installations, provided they were not interfered with, would work satisfactorily. Testing old installations would have the disadvantage of involving such interference. With regard to leakage and earthing, he was not much in favour of putting complicated apparatus in on consumers' premises. A partial solution to the problem was protective multiple earthing, but the Ministry of Fuel and Power conditions were so onerous that most boards just would not apply P.M.E. Finally, he suggested that in the past, the industry had stressed the dangers of electricity too much.

MR. E. JACOBI (Troughton and Young) criticised the fire statistics on which the author had based his case. He suggested that with new installations the important point to watch was adequacy. If enough lights and outlets were fitted, there would be less work by the amateur handyman in extending installations. Raising standards of components, etc., could make them so expensive that not enough were fitted, and the extension danger resulted.

MR. H. W. GRIMMITT (M. of F. and P.) first of all denied Mr. Gibson's accusations about the stringency of P.M.E. regulations. He went on to suggest that the 1/10,000 current leakage was a very mild regulation in terms of insulation resistance. He supported the author's suggestion on loop testing, but did not like Mr. Elliott's suggestion of an auxiliary earth electrode for use with e.l.c.b.s.

MR. F. R. M. STRAFFORD (Belling and Lee) while agreeing about the utility of the thermal protection, thought there was a case for the use of miniature c.b.s to protect radio sets.

MR. D. C. ROBERTS (I.E.E.) referred to the dangers associated with electric blankets; while MR. C. F. MAYSON suggested that the thermostats with electric blankets often gave trouble.

MR. T. C. GILBERT strongly attacked the idea of an auxiliary earth connection where e.l.c.b.s were used, suggesting that it did no good, and that it made testing from the protected apparatus impossible. He encouraged the use of double insulation where possible.

MR. R. H. RAWLL suggested that electrical safety was a problem which must be treated with proper respect, and that electrocution risk could not be ignored. Properly qualified inspection personnel were necessary for full safety.

MR. L. GOSLAND summarised E.R.A. statistics on the relationship between fires and age of installation. He testified to the general accuracy of fire officers' diagnosis of the cause of fires.

The AUTHOR replied very briefly.

The Case against ELECTRIC HEATING

By Prof. F. E. Simon, C.B.E., F.R.S.

Following upon criticisms by Meteor of certain views expressed by Professor Simon in connection with solid fuel and electric heating, we received a letter from him stating that these remarks were completely misleading and offering to write an article stating his views. This offer we have accepted so that our readers may be kept in touch with all that is being said on this important subject.

A FEW weeks ago I emphasised in a lecture that we have to revise our heating habits in order to avoid waste which we can no longer afford. This lecture was reviewed rather unfavourably—to say the least—in the ELECTRICAL TIMES and I feel that the facts presented to the readers were not sufficient to enable them to form a proper judgment. I am therefore grateful to the Editor for the opportunity of placing my point of view before them. May I say from the beginning that what I want to ensure is that electricity, the greatest helper in the fight for industrial efficiency, is used in the best interests of the nation.

The position can be outlined in a few words. At present we have not enough coal either for home consumption or export; this has very serious consequences for our own economy and that of western Europe. In addition, if we want to increase the efficiency of our factories we *must* produce much more electricity. In order to meet our present needs at home and for export we need another 40m tons of coal p.a., and in 10 years time our demand will have risen by a further 50m tons p.a. (These figures are calculated on the assumption that we use the coal in the way we do now.)

There does not seem any chance that our coal production can be increased so enormously. Are any new sources of power available which could come to our help? There are possibilities for the distant future such as atomic energy, but we certainly cannot count on any great contribution from them, say, within the next 3 decades.

The only way out is to make better use of the coal we have. Few people realise that we only make full use of a tiny percentage of our coal while the rest goes to waste. Ways are known whereby we could save 100m tons of coal p.a. and of this, half could be done with relatively little capital expenditure. This is the only reasonable way to deal with the situation.

Where can we save? There are many places in industry and the home where much could be done and I refer the reader to my book the "Neglect of Science" for more details. In this short article I want to mention only where a saving could be achieved very *quickly* in order to get us out of the present crisis before it is too late and I also restrict myself to points of particular interest to the readers of this paper.

Domestic Heating

One of the main culprits is domestic heating. We use about 60m tons of coal p.a. either in the form of coal, electricity, or gas to heat houses and offices with an average efficiency of barely 20%. If we increased this efficiency only to 45%, a very modest aim compared with what other countries achieve, we would save 25m tons of coal p.a., while at the same time producing 30% more heat. The open fire with its 15% efficiency and its prolific production of smoke and dirt must go. This could be accelerated by offering proper incentives, as was discussed in my lecture. Electric heating must be restricted to specialised purposes and cannot be tolerated as a main source of heating for reasons which we will now consider.

There are two principal forms of energy, free energy and heat energy. Free energy can be converted freely into other forms of energy, and electricity is in many ways our most valuable form of it. However only a fraction of heat can be changed into free energy. This is the reason why in converting heat energy into electrical energy in our power stations we lose so much. The most modern power

stations have a conversion efficiency of 30% while the average is only 20%. Thus electric fires utilise the coal used to produce the electricity at only 20% efficiency; this is not much better than open fires, while solid fuel stoves exist with efficiencies of up to 80%!

Plant Shortage

A second and equally important point concerns generating capacity. Compare the load curves at the midday peak in Winter and Summer and you will realise why our factories have to close down or to restrict their activities. The enormous consumption of electricity for heating has been brought about by wrongly conceived tariffs: we pay much for the first units and less the more we use. This policy, combined with the convenience of electrical heating, naturally encouraged its use. Electrical heating thus cuts into our economy twice over: by excessive coal consumption and by sterilising electrical generating plant.

The advocates of electrical heating point out that it improves the load factor and that if heat storing devices are used they need not draw current at peak periods. These, however, are expensive and the overwhelming majority of electrical heaters are in fact ordinary radiators. The installation of heat storing devices—as for instance electrical floor heating—is a possible long term policy but it does not help in our present predicament.

Another point put forward is that power stations use low grade coal which could not be used otherwise. Nobody however suggests that we should produce less electricity. On the contrary, we must expand production as much as possible in order to supply the needs of industry.

Sufficient supplies to industry can only be ensured if electricity is not wasted. A modern home cannot do without electric light, vacuum cleaners, radio, etc., and I would include also the occasional use of electric heating for bath- and bed-rooms and for invalids. If however we waste electricity lavishly on domestic heating which could be done with more efficiency in other ways, then we endanger supplies for essential purposes.

Penalise High Consumption

A proper use of electricity in the home could be quickly achieved by reversing the tariff policy, i.e., a cheap tariff for all legitimate uses of electricity and a very high one for everything in excess. It has been suggested that it would be insuperably difficult to arrive at a proper measure as to what is legitimate in every case. I cannot see that it is more difficult than to fix the figures for the present tariff.

I do not deny that changes such as I advocate have their difficulties, but what is the alternative? At present about 100,000 miners are doing nothing but gain coal in excess of what would be needed if proper methods of heating were used. Their output of coal, if used properly for supplying electricity to industry and for export, would change our economic position completely. May I finally point out that nothing special is asked of this country; no other country, not even the richest like America or Switzerland, dare to indulge in our luxurious ways of heating.

My suggestions may not at all appeal to some readers but if they reject them, they are under an obligation to provide an alternative solution for our hard-pressed economy.

STREET LIGHTING PRACTICE

DEVELOPED from recommendations made in 1937, the British Standard Code of Practice for Street Lighting which was published last week has been issued as one of the series of engineering codes prepared jointly by the Institution of Electrical Engineers and the B.S.I.

At present only the first part of the Code has been pubilshed, this covering Group A roads; a further part of the code being in preparation to deal with the design of lighting for other routes.

The Code explains what allowances should be made, when the lighting of a given road is planned, for prevailing conditions, e.g. volume and type of traffic, layout and nature of the road and its surface, boundary conditions, etc., in order that the required level of lighting expressed in lumens per linear foot of route may be secured.

Recommendations are made, for various circumstances, on the choice of light distribution (cut-off fittings or non-cut-off fittings), and on the spacing of lanterns. The use of either electricity or gas is envisaged, but electrical and gas installation practice is outside the scope of the document. Particular attention is given to considerations governing the placing of lanterns, and advice is included on methods of marking out a site. Recommendations are made for maintaining the performance of installations, and some notes are added on that procedure to be adopted as a check of performance.

Appendices set out the information which should be supplied by inquirers (when tenders are invited) and with tenders. The text is illustrated by numerous drawings, including diagrams of typical sites.

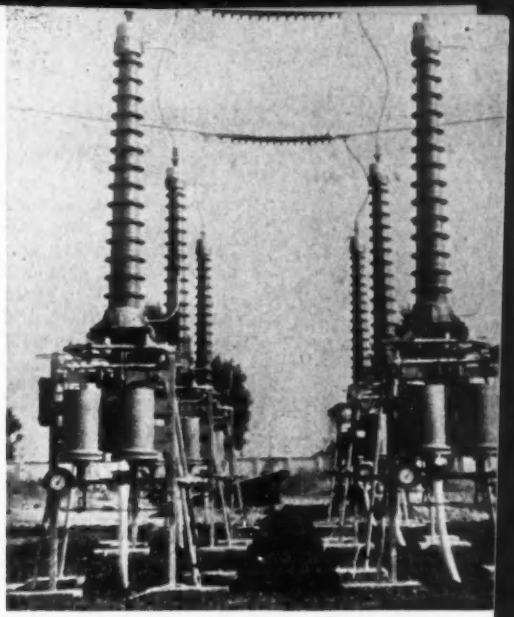
Copies of the code may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, S.W.1. Price 4s. post free.

220 kV Cables under test

FRANCE is one of the countries faced with the bulk transmission of power in order adequately to use the hydro-resources of the Alps and the Massif Centrale. In consequence high voltage research must occupy a leading place in their policy and in the Fontenay Testing Station near Paris there is nearing completion one of the finest stations of its kind in the world. All phases of high voltage research are provided for and direct connection with the 220 kV transmission lines enables work, when required, to be carried out under system conditions. Credit for the responsibility for the design and building of this project is due to M. Laborde, assistant manager of the research department of Electricité de France.

One section of the station is devoted to the testing of high voltage cables, for although in France they have had experience with 220 kV oil-filled cables since 1936, in view of the increasing size of the h.v. transmission system it was felt desirable to study the characteristics of other designs. Accordingly facilities are provided for looping test sections of cable in the 220 kV Paris network and for accelerated ageing tests.

The upper and lower pictures show respectively cable terminations and straight joints under test



Compression Cable

One of the cables which is under test is the Enfield compression cable and it is this which we describe in this article. It is composed of a 130 yd circuit of three single-core self-contained compression cables installed in collaboration with the Cablerie de Jeumont. Normal straight joints and end terminations were included as well as the ancillary equipment required to maintain the gas pressure.

The characteristics of the cable are as follows:

Conductor	400 sq. mm.—oval screened with carbon paper.
Max. design stress ..	135-kV/cm
Dielectric thickness	0·570 ins.
Nominal gas pressure	250 lb/sq. in.
Loading	200 MVA
Overall diameter ..	3·4 ins.
Weight/single-core/foot ..	15·8 lb

The cable includes a screened oval conductor, screened impregnated paper insulation, oval diaphragm sheath and reinforcements, circular pressure-retaining sheath with paper and non-ferrous metal reinforcements, and rubber sandwich protection. The nitrogen gas pressure is contained between the oval diaphragm and circular pressure-retaining sheaths.

Each cable terminates in a porcelain sealing end. These insulators are of single porcelain construction with semi-conducting glaze on the outer surface, and internally are subjected to an oil pressure of 250 p.s.i.

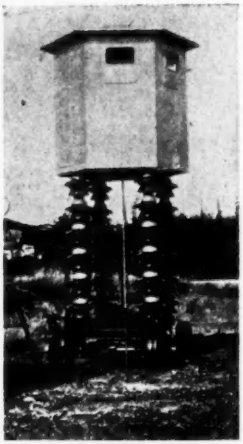


Fig. 3 Faraday Cage for P.F. tests

A compensator unit is fitted to each sealing end to accommodate the oil volume variation caused by atmospheric temperature changes and a small gas filling valve and gauge enables gas cylinders to be connected should a leak develop. The cables and the terminal equipment are shown in figs. 1 & 2. After the cables had been filled with gas and tested at 250 kV to earth for 30 minutes the following power factors remained constant at 0·0022 for voltages of 50, 100 and 150 kV.

Electrical Characteristics

In addition each drum length successfully withstood a gas pressure test of 300 lb/sq in. for 24 hours and one length was successfully submitted to 2 x working pressure, i.e. 500 lb/sq in. for two hours. The cables were laid in the ground in inverted trefoil formation in concrete troughs filled with sand.

Electricité de France are submitting this installation to a prolonged life test which includes load cycles. The current in these instances is provided by specially designed current transformers fitted around each phase, while at the same time the cable is connected into the 220-kV overhead line. Arrangements have been made to measure periodically the power factor of the dielectric using a Faraday cage (Fig. 3). In testing this type of cable at these high voltages it has been essential to develop special measuring methods in order to determine such items as sheath losses, conductor temperature and so on. For this purpose a special instrument kiosk has been erected adjoining the testing gronnd.

Our readers' views ...

Arc Lamps

IN connection with a series of lectures on the history of the electricity supply industry which I have been giving to the Week-end Schools of this Board, and also to the B.E.A. Summer Schools, I have been trying to get hold of a small arc lamp in working order, but despite extensive inquiries I have so far been entirely unsuccessful. Bearing in mind the national passion for hoarding, there appears to have been an astonishing holocaust of arc lamps, and if any or your readers could help me to find a survivor I should be extremely grateful.

S.W. ELEC. BOARD
DEVON SUB.-AREA. *G. T. Garwood*

Unconventional Wiring

BASED on opportunity to examine installation work, my opinion is that the standard of work is falling. Illustrating this view is the adjoining photograph of a strange lay-out.

A steel wire is strained between pillars which are some 60 ft apart, and two industrial lighting fittings are suspended from it. Four T.R.S. mains and an earth wire are strained from insulators in the usual manner, but as they are mounted above the steel wire, the natural sag of the cables makes them rub against the steel wire. This is an important point as the building is open at one side and winds will encourage chafing.

The lighting circuit is not, as is normal, strained between the pillars but is carried along by clamping between two wooden straps, the top of the straps being in turn clamped on to the T.R.S. mains. An attempt to strain the lighting cables appears to have been carried out as the wooden strap shown in the photograph is pulled sideways. It can also be seen that the circuit terminates at the last fitting.

Cecil M'Allister

GLASGOW

Notes on Wiring by MEGOHM

High Resistance Joints

Their Occurrence in Steel Conduit Installations

THE function of a steel conduit installation is to provide ducts into which conductors may be drawn for distributing electrical energy to outlet points. The conduit installation, if properly installed, will provide mechanical protection against damage to the conductors and permit the withdrawal of the conductors, should this become necessary during the life of the installation. The conduit system also provides the path for the return of leakage current, the value of which will be limited by the resistance of the conduit system to the earth terminal for the installation. The maintenance of a low resistance return path through the conduit system is essential to enable the prompt operation of protective devices, i.e., fuses and trip coils disconnecting the defective circuit or circuits from the source of supply so that a dangerous potential does not arise on the conduit system on the development of an earth leakage fault.

Number of Joints

The number of joints in a conduit system and the manner in which they are made will, of course, have a direct relationship to the resistance of the system. In general it can be taken that there will be at least one conduit joint to every five feet of conduit installed for general wiring services in buildings and on an installation where 10,000 feet of conduit is used, there will be some two thousand joints, all a potential source for high resistance faults.

From tests and observations made over a number of years there has been, as one would expect, a fair percentage of slack joints, the probable cause being due to the use of worn dies and joints not drawn up tightly in awkward positions. It does not necessarily follow that a reading of under one ohm indicated on the continuity tester at the time of testing a new installation means that all joints in the conduit system have been properly made, since a slack joint can develop into a high resistance connection some time after installation, due to the presence of moisture setting up corrosion and/or displacement by vibration. As an example, the high resistance of a slack joint can be made to equal the low resistance of a well made joint by slight pressure and it has been known to tap joints with a hammer in order to reduce the resistance of the conduit system, but this is obviously a very unsatisfactory expedient and there is little doubt that the resistance will in time rise again.

The increase in resistance over a period of a few years between well made and slack joints in exposed positions has been found to be :

on screwed conduit systems . . .
up to 8.5 milliohms and
on grip conduit systems . . . as high as 10 ohms

from which it is clear that a more positive joint is provided by a screwed coupling than a grip coupling and it is evident that great care when jointing must be exercised in the erection of grip conduit installations to ensure the maintenance of a low resistance continuity path. The installation of grip conduits in outdoor locations is certainly not advisable.

The resistance of clearance hole jointing between conduits and conduit boxes, distribution boards, etc. by means of :—

(*a*) conduit couplings and smooth bore male bushes, and

(*b*) back nuts and ring bushes

is slightly less than a screwed joint. When using back nuts and ring bushes, the addition of a compression washer will tend to improve the joint conductivity in the event of the joint not being fully tightened. Joints well made on screwed or grip conduit installations will maintain a low resistance, but unfortunately it is unlikely to find on conduit installations that all joints have been properly tightened.

The use of protective conductive pastes, such as lanolin compounds, red lead or atomised lead, will help to prevent a percentage of high resistance joints arising due to slackness in the joints. Whilst the use of protective conductive compounds may slightly increase the resistance of well made joints there is, however, a very small increase in resistance which will not materially affect the continuity of the conduit system, but the advantages gained in the use of such compounds will lie in the protection of the joints throughout their normal life.

Progress in Production during 1951

ENGLISH ELECTRIC CO., LTD.

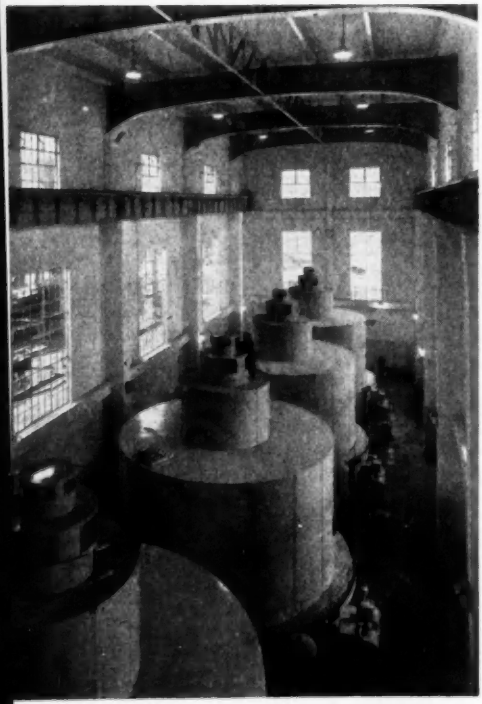
OWING to the enormous range of equipment, from f.h.p. motors through to large turbo-alternators, and from domestic equipment to aircraft, made by the English Electric Co., we are only able, in the space at our disposal, to give some of the more outstanding items of equipment dealt with in 1951.

In the large turbo-electric field, new plant allocated and ordered during the year amounted to over 600 MW. Much of this is for the B.E.A. and includes two 60 MW sets designed for 1,500 lb/sq in. at 1,050° F to go in at Drakelow. In addition, three 60 MW sets operating at 900 lb/sq in. and 900° F were ordered for Calder, Wakefield, and a 100 MW unit at 1,500 lb/sq in. and 1,050° F for Willington.

Plant commissioned during the year amounted to 350 MW; the largest individual unit being of 60 MW, using hydrogen cooling, for Fulham. At the moment this is running at 600 lb/sq in., but when the h.p. boilers are installed will be up-graded to standard conditions of 900 lb/sq in., 900° F.

In the export field, two of the four 60/66 MW, 3,600 r.p.m. sets have been installed at the J. Clark Keith power station in Canada, and the fourth has now been ordered. Nearing completion are two 30 MW sets for Finland, two 30 MW sets for Pretoria "B," and two 15 MW sets for India. Seven 30 MW sets are being built for Vierfontein.

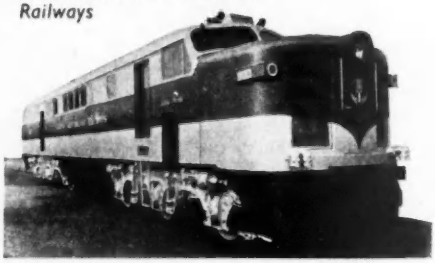
The four 32·5 MW water turbine sets now in commission in Loch Sloy power station



Hydro-Electric

The fourth 32·5 MW unit for Loch Sloy and two 22 MW sets for Fasnakyle have been commissioned at home, and abroad, units include one 25 MW set for Tekapo, New Zealand, one 12 MW set for Butlers Gorge, Tasmania, and a 40 MW set for Spain.

The first of ten 1,760 h.p. diesel electric locomotives, Type AIA-AIA, for the South Australian Government Railways



Joint contracts placed with the English Electric Export and Trading Co. and the Metropolitan-Vickers Electrical Export Co. resulted in the commissioning of two 45 MW sets for Castelo de Bode and two 39,000 h.p. turbines for Vila Nova, also in Portugal.

An order was received for a 106,500 kVA generator for Kemano power station of the Aluminium Company of Canada, and this will be the largest generator ever manufactured by a British company. A further order was received by the combined firms for Cabril power station in Portugal. The English Electric Co. in this case will be manufacturing the turbines and generators, which are rated at 63,000 h.p. and 60,800 kVA respectively.

Transformers

Large transformers, ordered by the B.E.A., include two 120 MVA, 275/132 kV, 3-phase, auto-transformers, with on-load tap changing gear for Drakelow, which will be coupled to the 275 kV system. Three 50 MVA, 66/11 kV, 3-phase units and four 15 MVA, 66/11 kV units for the London Electricity Board are also on order. Generator transformers include a 57 MVA, 35/10·5 kV unit for the B.E.A. Yorkshire Division.

From abroad a considerable volume of important business in this field has been received, including eighteen 30 MVA, 132/42 kV, 3-phase units for the Electricity Supply Commission, Rand, South Africa, and four 100 MVA, 110 kV, 3-phase double unit booster transformers with on-load tap changing gear for Tasmania.

Metal cathode ray tube for English Electric television receiver

The first of two 64 MVA, 220/110 kV, 3-phase fully insulated transformers was despatched to Finland and is now erected on site. Three 40 MVA, 150/15 kV, 3-phase generator transformers for Cofrentes in Spain, and two 132/88 kV, 60 MVA, 3-phase banks of single-phase transformers for the Electricity Supply Commission, Orange Free State, South Africa, were also despatched.

Switchgear

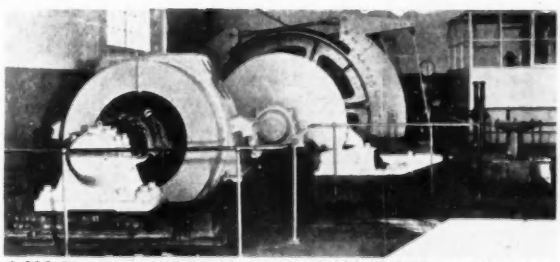
The demand for both outdoor and indoor oil circuit-breakers continued to be heavy and 33 kV units were ordered for India, Greece, the Area Boards and the North of Scotland Hydro-Electric Board. Many orders were also received for indoor equipment,

25 kW induction heater (side removed)

particularly for industrial use at voltages of 6·6 kV and 33 kV.

Among switchgear delivered was 110 kV and 33 kV outdoor and 11 kV kiosks for the Madras Government; two complete 66 kV outdoor substations for the Yorkshire Division of the B.E.A.; a number of 66 kV outdoor circuit-breakers for New South Wales Railways and South Australia; 33 kV outdoor type switchgear for substations in South America; and a large number of 33 kV circuit-breakers for the Department of Railways in Australia.

Among air-blast switchgear, home and export requirements included two 132 kV substations for the B.E.A., one 132 kV substation for the North of Scotland Hydro-Electric Board and a further 132 kV substation for Spain. Various other installations of air-blast switchgear were made at Peterborough and Westwood power stations. Equipments supplied to the B.E.A. were for the 132 kV substations at Beddington (Croydon) and Southern Cross (Brighton).



1,020 h.p. a.c. winder operating at 6,600 V, 3-phase, 50 c/s and provided with dynamic braking at Springfield Colliery, South Africa

Deliveries abroad included a 132 kV outdoor station for Scandinavia, 165 kV and 132 kV breakers for Spain, 150 kV breakers for Holland and 110 kV breakers for Tasmania.

Rectifiers

Two unusual equipments rated at 6,000 kW, 550 V and 2,500 kW, 540 V were ordered by a large steelworks. On the railway electrification side equipments were ordered by British Railways (S.R.), New South Wales and the Netherlands Railways. Electrolytic refining in Northern Rhodesia was extended by the delivery of the first of four 10,000 amp, 325 V equipment.

High voltage rectifiers for radio transmitters have been supplied to, and are on order for, the B.B.C.

Industrial

Among numerous mill drives supplied or on order is the 27,600 h.p. unit for Abbey Works, now operating.

Mine winders and haulage equipment is on order for the National Coal Board and for South Africa and Australia.

Textile electrification is well in hand, one of several orders being for the complete electrification of John Bright's Moss Mill, Rochdale, and work is continuing on the extensions at Lostock Hall Mills, Preston. A contract was also received for the complete electrification of John Dugdale's Mills at Blackburn.

Work is nearing completion on a frequency changer for Victoria, New South Wales, Australia. This machine connects a 25 c/s to a 50 c/s system, and can deal with 30,000 kVA. It is 63 ft long and runs at 750 r.p.m. Seven machines in line are included in the complete equipment.

Traction

On the traction side, numerous orders have been received for diesel-electric locomotives ranging from 350 h.p. to 1,760 h.p. Straight electric locomotives for operation at 1,500 V and rated at 1,800 h.p. have been built for the New Zealand Government Railways, and motor coaches for 1,500 V working have been supplied to the Indian Government Railways. For British Railways (S.R.) eleven 350 h.p. diesel-electric shunting locomotive equipments, together with traction motors and control equipments for 124-600 V d.c. motor coaches of the latest standard type for suburban electric trains, are on order.

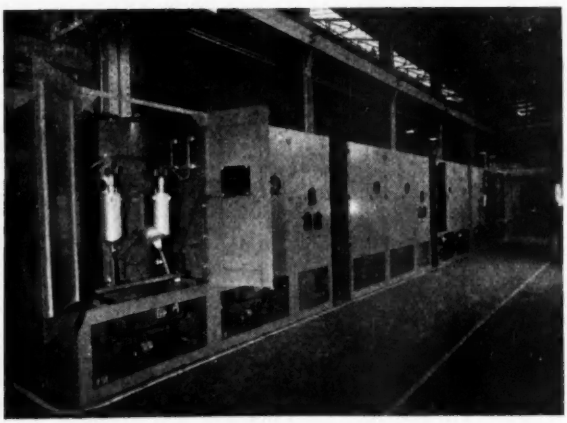
For the South Australian Government Railways, ten 1,760 h p. diesel-electric locomotives are now being put into service. These are the first main line diesel-electric locomotives to go into operation in South Australia. They are AIA-AIA type and are to be employed in the haulage of heavy express passenger and freight.

Electronic Equipment

A new 25 kW induction heater using a single air-blast cooled oscillator valve, made by English Electric, has been designed for production line work.

In the television field, two major design developments have been incorporated. One, the "black level clamp" locks the tone value of the picture reproduced to that transmitted, and the other is the introduction of the "metal cathode ray tube" with a face diameter of 16 in.

In the domestic field, a new item introduced was the model 76A refrigerator, with a 7·6 cu ft food compartment and a shelf area of 14·6 sq ft. The refrigerator unit comprises a self-oiling vertical reciprocating type compressor directly coupled to a brushless $\frac{1}{6}$ h.p. motor and a plate type condenser. The complete unit is hermetically sealed and is spring mounted and rubber cushioned to ensure quiet operation and freedom from vibration.



Bank of three 1,224 kW, 1,530 volt pumpless steel tank rectifier units supplied to the Netherlands Railways

Problems and Practice IN ENGINEERING

A Soldering Tip

IT happens all too often that while articles such as brass cable sockets, flanges, etc., come from the makers ready "tinned," yet it is very difficult to get the final solder to adhere when one comes to dip and re-tin them before use. This is because the solder pot into which they were first dipped has been too hot, and this has burnt the zinc in the brass. The solder in the pot quickly becomes "killed" in consequence. The application of a tablespoonful (or so) of powdered sulphur into the solder pot just before dipping will correct matters, and a well-tinned job will result. A thick scum will form which can be skimmed off in the usual way.—*G.V.B.*

Steel Chimney Protection

WITH the use of air-preheating the temperature of the flue gases exhausted to the chimney has been very considerably reduced, and this in turn has been responsible for shortening the life of the steel chimney stack unless suitable protective measures are taken. The chief trouble with steel chimneys is corrosion which may take place both internally and externally resulting in a gradual reduction in the thickness of the steel plates. Internal corrosion is attributed largely to the fact that so much heat is abstracted from the flue gases that the chimney temperature is reduced to a figure which rarely exceeds from 290-320° F. There is considerable condensation of the steam in the gases, resulting in the formation of moisture which together with the sulphur and dioxides of carbon present forms very highly corrosive acids. Internal wasting will be minimised by using coal having a very low sulphur content but this is not always possible. The possibility of high dew-point temperatures should always be kept in mind as the dew-point of sulphuric acid is over 600° F. It has been suggested that the flue gases adjacent to the inner wall are cooled below dew-point and moisture from the gases is deposited in this way. This moisture picks up sulphur from the gases, thus forming a dilute solution of sulphuric acid which subsequently causes rapid corrosion. External corrosion is usually caused by rain and snow and also, at the uppermost sections, by the dioxides of sulphur and carbon in the gases in association with moisture, if the flue gases are blown some distance down the outside of the chimney. Painting the outside of the stack with oxide of iron paint, say at least every two years, or as soon as the old paint shows signs of peeling off, will generally guard against external corrosion. Before applying a new coating the surface should always be thoroughly cleaned by the use of good wire brushes. The problem of internal stack corrosion has brought into use numerous ways of endeavouring to counteract it, some of which are:

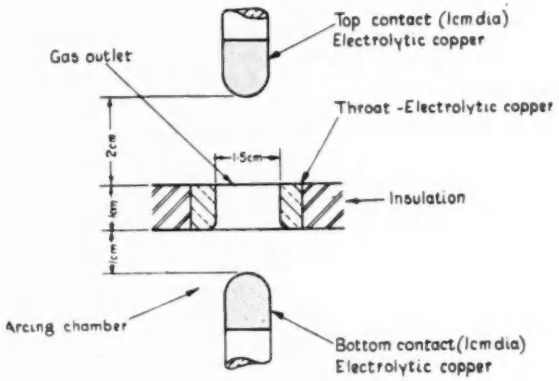
(1) Lining with acid-resisting cement which is applied by a special gun.
(2) Lining with acid-proof bricks set in acid-proof cement.
(3) Lining with an asbestos mixture of cement which is applied by spraying.
(4) Applying a metal coating of lead or aluminium by oxy-acetylene gun.
(5) Fixing asbestos sheets with a backing of mastic composition.
(6) Coating with a special paint. The ideal paint should be able to withstand the activity of heat, expand and contract along the surface without cracking, peeling or flaking off, and be acid resisting.

The writer has tried the third method and it proved quite successful on a two-shift power station, the plant closing down daily which consequently aggravated the corrosion. The chimneys were thoroughly cleaned internally and given a coat of special adhesive paint before applying the asbestos-cement mixture. It is preferable to include a suitable reinforcing mesh or alternatively provide welded spikes on the plates and to always allow the protective coating to dry out before putting the boilers on the line. In this way the coating has a reasonable chance of drying out and becoming solidified and good adhesion to the plates is usually ensured. Experience showed that it is futile to apply this form of protective material once a chimney has been subjected to boiler flue gases.—*M.I.C.E.*

Contributions to this page dealing with specific items o interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

E.R.A. REPORTS

—*Further investigations into Arc Behaviour*



The contact arrangements in E.R.A. experimental circuit-breaker are shown diagrammatically here

IN switchgear design and development, the behaviour of the arc drawn out between the fixed and moving contacts is of great importance, particularly as far as air-blast breakers are concerned.

One of the recently published E.R.A. Reports, No. G/XT 131, "Gas-blast Circuit Breakers: A Preliminary Study of Arc Form and Movement in a Single Axial Blast Experimental Model," by F. Oliver Mason, gives details of an investigation made into the physical nature of the arcing phenomena involved. This report covers, however, only the preliminary stages of a comprehensive study which is being made into the subject.

Equipment

In order to obtain a general picture of the form and movement of the arc, the study has been confined to the top (or down-stream) gap of the E.R.A.'s experimental X-switch. Initially a rotating-drum camera was used to photograph the cross-section of the arc. The current used was approximately symmetrical, with a value of 1,100 amps r.m.s., obtained from a generator excited to 6·6 kV. A certain amount of inductance was included in the circuit.

The only variable in the test conditions was the initial reservoir gas pressure, although most of the tests were made with an initial pressure of 65 lb/sq in., as being fairly representative of the pressures normally met.

An optical system was arranged so that the arc could be photographed from two directions at right angles, and the arc current and voltage were recorded on the usual Duddell-type electromagnetic oscillographs.

In order, however, to obtain a closer correlation between car volts and arc movement, some voltage records were obtained from a small cathode ray tube.

After the first few records had been obtained with the slit aperture horizontal, it became obvious that the arc had a vigorous lateral movement. To check this was not confined to any one vertical plane, simultaneous pictures were taken at right angles and by co-ordinating the position of the arc from these two traces, it was possible to plot the actual movement of it in the horizontal plane. This showed that the arc movement was generally of a circulatory nature and in an anti-clockwise direction looking from above into the throat. The mean peripheral velocity of the arc's main circulatory motion was roughly 50,000 cm/sec—approxiamtely twice the velocity of sound at normal temperatures and pressures.

Records taken at the bottom of the upper electrode tip were of particular interest as the arc appeared to have its maximum displacement at this point, and it appeared that the arc root actually rotated about this contact.

It was also noticed that at higher pressures when the general light from the arc was low (current zero), a short time high-intensity discharge could be observed, corresponding to the arc restriking.

The Report is available from the British Electrical and Allied Industries Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, and its price is 15s.

PLANT IN NIGERIA

Notes on its behaviour, transport and working conditions

by J. MELLANBY, M.A., A.M.I.E.E., M.I.H.V.E., M.Inst.F.

THE following notes on the behaviour of various types of electrical equipment under tropical conditions are based on experience gained in Nigeria. It is hoped that they may prove of some value to those manufacturers and exporters interested in that market and others where conditions are comparable. No claim is made as to the exhaustiveness or finality of the conclusions reached, but they should at least be a guide to present designs which have proved satisfactory or otherwise, and point the way to future developments.

The differences between conditions as affecting electrical equipment prevailing in Britain and Nigeria have been listed under the following headings: 1, Climate and topography; 2, animal and other life; 3, the human element; 4, transport and packing. The following types of equipment will be considered: Cables, wiring accessories, control gear and fuses, motors and starters, domestic appliances, small generators and engines.

Climate

Over the southern portion of Nigeria, the following conditions generally prevail: January to May. Dry Season. Temperatures, minimum 70° F., maximum 100° F. Occasional rain. June to December, Wet Season. Rain on most days. Maximum temperature 90° F (occasionally), not often above 80° F. December-January, Harmattan. This is a dust-laden wind blowing from the Sahara Desert. Night temperature 65° F or less, R.H. 100%. Early-morning mist. Mid-day temperature 95° F, R.H. 20%. The average temperature is 87° F Rainfall varies greatly from place to place, being about 150 in. on the coast, decreasing inland northwards. Part of the Cameroons has the astonishing rainfall of 30 feet. Greater extremes are found farther north, especially on the high land of the Bauchi Plateau (over 2,000 feet above sea level).

Owing to the nature of the soil, low resistance earths are seldom found, values running into hundreds of ohms being common. Thunderstorms are common during the Wet Season, when they most commonly occur during the afternoon or evening. Since overhead distribution mains are almost universal, surges are very troublesome. Although surge arrestors are not commonly installed on l.t. systems, the following experience should illustrate their value.

During one period of three months, September to December, on a system supplying 40 houses, 22 cases of damage by lightning were reported, involving wiring or domestic appliances. Most of these were electric irons, since

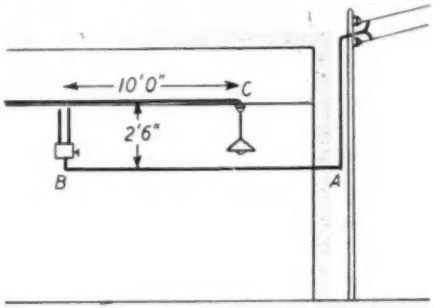


Fig. 1. Wiring in a Nigerian house

it is the normal practice for the domestic servants to do the ironing during the afternoon, when the storms most frequently occur; a terror-stricken "boy" would then take the iron to the electrician with the remark that "fire come out." It was amazing that, though the "boys" invariably went barefoot and worked on concrete floors, none of these accidents were accompanied by shock.

The single case involving appreciable damage to the wiring was most interesting; this is shown diagrammatically in Fig. 1. An overhead service line continued in twin t.r.s. to a 2-way splitter switch fuse. Parallel to this cable for a distance of 10 feet and some 2 ft 6 in. away was another twin t.r.s. cable supplying a verandah light. Sharp right-angled bends occurred at A, B and C. The switch fuse was shattered, only the case remaining on the wall; the cast-iron cover, fuse carriers and bases being deposited on the ground in small pieces. The conductors of the cables at A, B and C were burned through, though the sheathing

was undamaged. This seemed to be a perfect demonstration of the high-frequency nature of the discharge as stated in the text books.

After this experience, arrestors of the non-linear resistor type were installed, and in each of the following wet seasons, only two or three cases of damage were reported.

Animal Life

There are no records of damage to electrical plant by any of the larger fauna, such as elephants or lions, but rats occasionally gnaw cables, and insects and fungi can be very troublesome. Termites can be most destructive, but they are mainly attracted by softwood, so the avoidance of this in proximity to electrical gear is a good insurance. The Mason wasp builds a nest of mud, somewhat like a miniature swallow's nest. It loves dark corners, and seems strongly attracted to the interior of main switchgear, radio cabinets, etc. When a t.r.s. cable is taken through a conduit entry into a switch, there is plenty of room for the wasp to enter, and it is often found that when the time comes to operate the switch, a nest or series of nests will prevent this. Driver ants are attracted by substances like the compounded braid on v.i.r. cables, empire tape, etc. They seem, however, to prefer to work in the dark, as cables cleated to the surface of a wall are seldom attacked, while those inside a bus-bar chamber may have their insulation seriously damaged. Fungi and moulds are also a frequent source of trouble, v.i.r. cables, even in store, are often attacked, though after wiping they usually appear none the worse.

Human Element

Under this heading comes everything connected with marketing, installation and servicing of electrical gear. Some manufacturers are represented, at least in the larger towns, by agents who carry stocks of their products and spare parts and can effect repairs. These agents usually take the trouble to ascertain that the goods they are handling are suitable for the country. Other agents may carry stocks, but they know nothing about what they are selling, stock no spares and give no service. Yet a third type of agent merely books orders. Finally, many customers place orders direct with overseas firms—sometimes they know exactly what they want, but very often they are non-technical, and do not give the manufacturer adequate information to enable him to supply the most suitable equipment.

After installation, equipment is more often than not under the charge of non-technical people. This particularly applies to a small generator which may be left to the mercies of doctors, missionaries, teachers, agricultural or administrative officers, etc., and never be seen by an engineer during the whole of its working life. It is a remarkable tribute to some British manufacturers how well their products stand up to this treatment, especially when one takes into consideration the dearth of skilled mechanics.

In these days of shortages, especially of spare parts, there is severe temptation to the agents to profiteer; a recent case was that of piston rings for a popular make of engine which cost 2s. in London being sold in Lagos for 7s. 6d. Industrial plant and spares are exempt from import duty, and freight should not have added more than 3d. per ring. In defence of this, agents frequently complain that it is much harder to persuade certain manufacturers to supply spare parts than complete equipment.

Instructions

Clear, simple, and complete erection and running instructions are necessary, but not always supplied. Easily-read drawings are essential, and instructions should be in English; a French translation may also be useful for the benefit of Continental, Lebanese and Syrian merchants and people from neighbouring French territory. Metric dimensions usually only cause confusion. There is no necessity to translate instructions into any of the local languages—there are 47 of these in Nigeria alone—and since none of them contains any technical terms, half of the directions would be in English anyhow.

In view of the great distances between centres of population and the dearth of facilities, manufacturers are specially asked not to send out instruction books containing this sort of paragraph:

> "Do not attempt to dismantle or adjust the . . . yourself. There is a fully qualified and equipped Service Station in your town. Addresses and telephone numbers will be given on the back page . . ."

Our American friends are possibly more often guilty of this sort of thing than ourselves, but it is a most exasperating sort of thing to read when the nearest service station is hundreds or even thousands of miles away. When apparatus contains components of this nature, the manufacturer and the agent should see that it is supplied with a spare part which can be changed over while the faulty one is sent away for proper servicing, either to a local or overseas depot.

Most goods travel to Africa by sea, and

adequate packing is essential. Even the present high cost of timber should not tempt makers to skimp on this item. Some West African ports have modern cargo handling facilities, at others lighters are used, and at some surf boats. Torrential rain is frequent on the coast, and goods can get very wet either on deck or on the wharf side. Finally the words "This Side Up" are frequently either not understood or ignored; of 12 generating sets and one engine known to the author, all of which were delivered by lorry from the docks, five were on their sides, six upside down and only two the right way up. It is essential therefore that cases be made strong enough to support their contents in any position, and that they be made sufficiently waterproof against anything short of total immersion. One consignment of machinery packed in galvanised water tanks fitted with tarred paper lined timber covers, arrived with some inches of water in each tank! *(To be concluded)*

BATTERY TRUCKS GO MINING!

TWO fine examples of the convenience of electric propulsion for mine working are provided by special-purpose vehicles which have been supplied by Smiths Electric Vehicles Ltd. to the United Steel Co. Ltd's. ore-mining branch. One of these units is an explosives truck, working between the surface magazine and the face of the headings, and the other a model carrying an 18 ft high telescopic tower.

Both these vehicles are modified models of the Smith's Electric Vehicles' "N.C.B. Electric" battery electric chassis. Changes made from the standard model include speed limitation to 4 m.p.h. and the provision of quickly removable batteries for shift working. For this latter purpose, a spare battery is provided with each truck. Provision for mining conditions is made by fitting steel sheeting in various places.

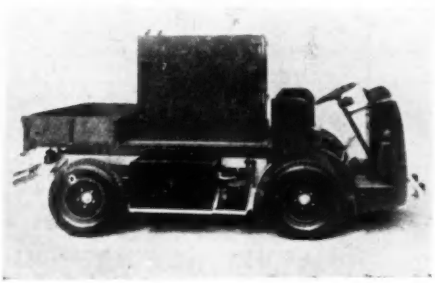
Lighting equipment comprises two headlamps, two rear lamps, and an automatic reversing lamp, the latter being a standard headlamp on the rear of the chassis, operated by an auxiliary switch on the main forward and reverse switch. A separate 12 V 81 amp-hr battery (Exide) is provided to supply this comparatively heavy lighting load.

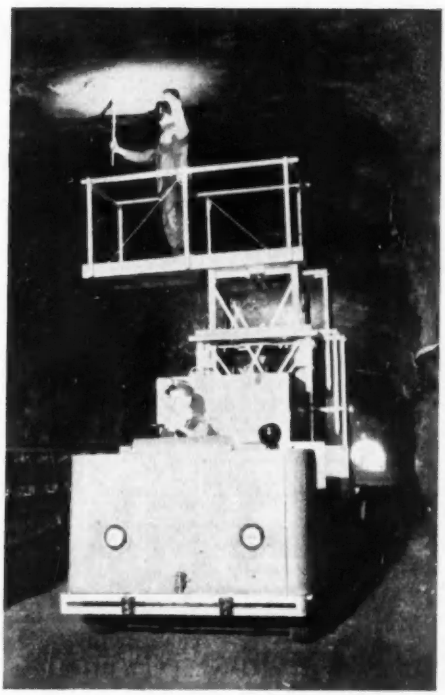
The main traction batteries are of 258 amp-hr capacity at a five-hour rate, and consist of 18 Exide Ironclad cells specially designed for this type of work. Battery changing is facilitated by fitting double-pole "Anderson"-type concentric plugs and sockets. To give the speed restriction already mentioned, the number of battery cells has been reduced from the normal 36, and the B.T.H. controller arranged to operate normally in the "batteries parallel" position.

Motors for the trucks are Metropolitan-Vickers series-wound fan-ventilated machines, one-hour rated at 10·6 and 12·6 h.p. for the 30 cwt and 2-ton chassis respectively. The heavier truck, which carries the extending tower, also has a 2-h.p. 36 V electric motor connected to the traction battery and chain coupled to an oil pump which operates a hydraulic ram.

(Right) The iron scaling car for United Steel Co. being used for roof inspection

(Below) The N.C.B. 30 cwt explosives truck



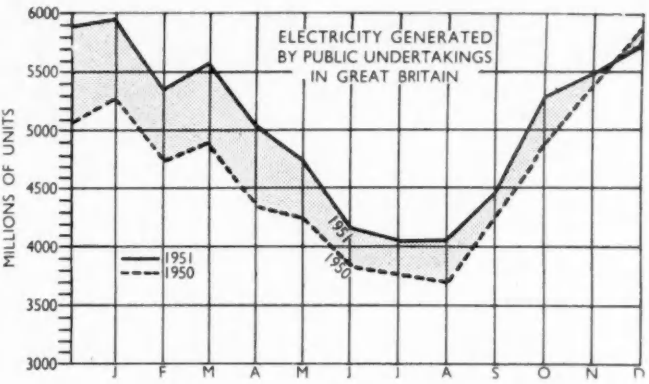


UNITS GENERATED

5,762 million units was the total generated during December in stations under the control of the B.E.A., the North of Scotland H.E. Board and the Lochaber Power Co. The corresponding figure last year was 5,902 million, so there has been a decrease of 2·4%.

Of the total, 5,505 million units was generated in steam stations and 242 million in hydro-electric.

Energy sent out during the month was 5,445 million units, 94·5% of that generated. This gives the total for the year up to December 31st as 51,907 million units, showing an increase of 9% on the year 1950.



POWER SUPPLY IN DECEMBER

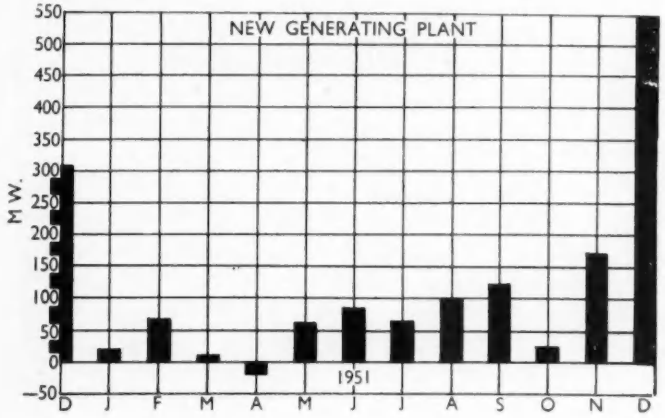
DETAILS of the B.E.A.'s plant installation in December have already been discussed in these columns. There remain, however, some remarkable points for comment from the generation statistics for this month and for the year it completed.

The most notable fact about the figures is that the units generated fell below the corresponding total for the previous year (i.e. December 1950) for the first time for many years. Probably the principal underlying factor here was the relative mildness of December, the average temperature last month exceeding that in 1950 by 7·8°F. Another notable figure is the total generation of energy by water power, which easily hit a new high record at 242m units. Of this total, North of Scotland stations contributed 164m and B.E.A. hydro stations, 78m units.

Complete fuel figures for the year show that the B.E.A. burnt 33,914,000 tons of coal for electricity production, and the North of Scotland Board, 216,000. In addition, the two authorities used 69,400 tons and 14,600 tons respectively, of oil. Steam for sale involved the burning of 128,000 tons of coal, while coke to a total of 775,000 tons was consumed for all purposes.

Installed Capacity

Turning to installed capacity figures, it is of interest to note that the Ministry of Fuel and Power figures, based on the definition given at the side of our monthly diagram, show an increase of 1,154 MW for the B.E.A. against 1,235 MW announced as new plant installed. The balance of 80 MW is the total of turbo-alternator sets taken out of service or down-rated.



GENERATING PLANT

At the end of December, 1951, the installed capacity of the B.E.A. was 15,711 MW, showing an increase of 550 MW during the month. During the same period the North of Scotland total went up by 1 MW to 617 MW. The month's commissionings bring the overall increase during the past twelve months to 1,253 MW, or 8·3% of the December, 1950 total.

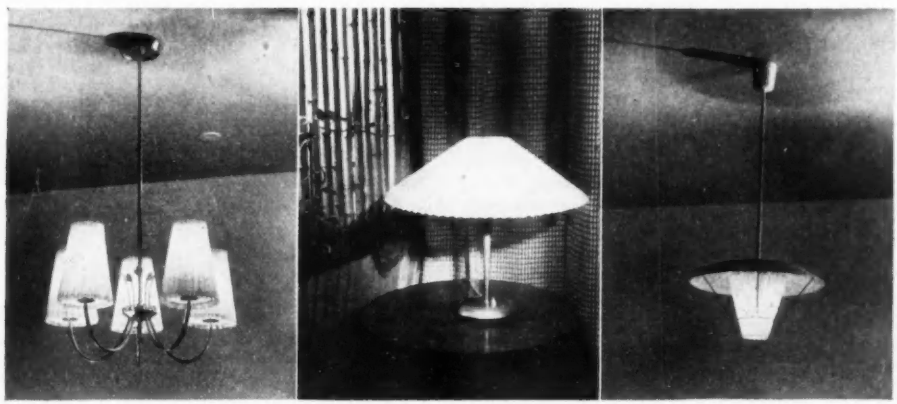
The total installed capacity used for the purpose of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides, and are suitable for service.

G.E.C.'s New Contemporary Fittings

FOLLOWING on the stifling of design in the home and in commercial locations during the war years there came in the immediate post-war year a vigorous renaissance in style and design. This awakening was not confined to our own country; in fact, the Scandinavian countries led the way with a refreshing new and light-hearted style in furnishings and fittings for domestic and commercial use.

New materials, of course, have helped this renaissance; now used in the manufacture are buckram, paper, plastics and glass. The General Electric Co. naturally entered the contemporary fittings field and their design staff has produced a range of fittings which do the firm, the country, and their designers, the greatest of credit. We illustrate examples from the range :—

Left is a five-lamp pendant fitting in bright lacquered brass, with pleated shades in champagne bukram or red polka dot fabric (Cat. F.34033). Centre is a table standard for the home. The centre shaft is Burma teak on a lacquered brass base (F.38038). Right is a pendant fitting for one 100 W lamp. The reflector is perforated metal in pastel enamel, with peach bukram shade (F.30043)



Thermal Storage Heating

THE use of thermal storage in order to reduce the peak-load is well known in the water heating field. Its application to space heating has not however been greatly used due to the difficulty of obtaining a material with the necessary high thermal capacity.

An important advance in this direction has, however, been made by the Aberdare Electric Co., Ltd., of Finglas, Co. Dublin, who have recently provided thermal storage radiators for the Irish Embassy in London.

Three outstanding features are claimed for the "Thermodare" units. These are: extremely uniform heat output, small size and neat appearance and low capital cost.

The basic feature of this heater is that the heat storage medium is a solid refractory material in which heating elements are threaded through ducts, and the whole is heat-insulated and encased in sheet steel of robust design.

Occupying a floor space 21 in. wide and 11 in. deep, the "Thermodare" is particularly suited for installation in narrow corridors and passages. Its projection from the wall is so slight that it is comparable to the depth occupied by hot water radiators, and has the added advantage of dispensing with the pipe installation attendant upon the latter system.

The "Thermodare" is designed as a unit with individual control. The unit construction facilitates the coupling of two or more heaters together in order to form larger units and to give increased heating load. Provision is made for wiring one heater to an adjacent one, substantially reducing installation costs.

Although they were introduced only 15 months ago, Ireland is already well ahead in the use of these heating units. There are 15,000 in commission.

Catering for Comfort!

Electricity the perfect servant meets the men who matter at Hotelympia, London

GOOD food and comfort above all else are major considerations with the normal Briton and our catering industry much maligned by ill-informed critics, is to date in the front rank of the world's best.

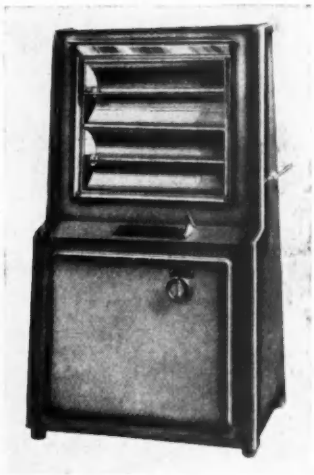
Not a little of this success of Britain's hotels and restaurants, tested to the full during Festival Year is, we believe, due to the adoption by wise hoteliers of electricity as a clean and efficient servant.

At the Hotel Exhibition which opened at Olympia yesterday the world's most famous chefs and *Maitres d'hotels* will mingle with the many young apprentices aspiring to future fame. Amongst our own electrical industry member firms have been awake to this opportunity of showing to these visitors the advantages of electrical power in making their establishments more comfortable and efficient.

One of the most important factors in making one's guests come again is to ensure a sense of internal well-being. Our own British chefs excel at this sort of thing and are aided by the wealth of labour saving hygienic electrical equipment. Food preparation equipment of all varieties and brands is on view. Notable new and interesting items include a 14 lb. bench type electric vegetable peeler by Crypto Ltd., and an electric pastry roller shown for the first time by the Hobart Manufacturing Co., of Southgate.

An important exhibit on the stand of Euk Catering Machinery Ltd., is the 24 slice toaster which we have illustrated. Biggest brother of family, this model does much to speed up service of toasted snacks in quantities to satisfy any demand.

This is Crypto's new potato peeler



G.E.C.'s shilling in the slot prepayment meter is suitable for hotels

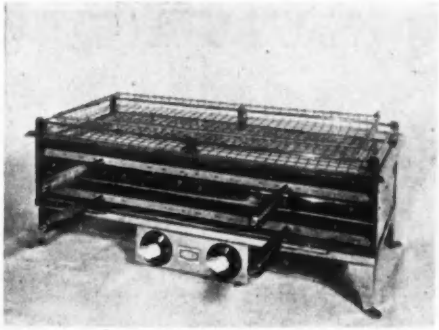
Storage of food and materials is a problem for many a manager, but the full range of Prestcold refrigeration equipment will offer many sound ideas. New items include the SC.154 service cabinet of 15.4 cu. ft. capacity and the OFC.351 frozen food cabinet and ice cream conservator with a capacity of 350 lb. of frozen food or 48 gallons of packaged ice cream.

Cooking by electricity has many antagonists both official and unofficial, but visits to the stands of Simplex Electric, Jackson Electric Stove Co., G.E.C. and many other firms will show how clean and convenient it all is. Shining and we mean that literally, shining examples are the Creda Unit type range (H.C.4904) seen as a single unit, but equally at home in group situations, and Jackson's pastry oven which will feature in daily demonstrations throughout the exhibition. Of course the other Jackson exhibits are equally important. They include hot cupboards, bain maries, grills and boilers, steaming ovens and complete ranges.

Of course, the General Electric Co., Ltd., is to be mentioned here because it is their proud claim that there is no electrical requirement of the hotel or restaurant that they are unable to supply. G.E.C. are featuring mainly equipment for the smaller kitchen including such items as a double-oven range and a single-deck pastry oven, but equally important to the hotelier is the other equipment which includes water heaters, luminous call systems, fans, lighting equipment which includes new designs, urns, and electric fires which include the combined fire and shilling-in-the-slot meter featured in our illustration.

With this accent on clean cooking equipment, we tend to crowd out the other aspect of cleanliness and electricity, viz. vacuum cleaning. Two prominent firms in this field are exhibiting, namely Hoover, Ltd., and R. G. Dixon, Ltd. Hoovers are making a general feature of their range of cleaners which are so well known and used that they require no further description.

R. G. Dixon, however, have divided their display into two sections—scrubbing and drying and floor polishing and vacuum cleaning. The "Scrubmaster," which was featured at the B.I.F., scrubs and drys in one action.



This 24 slice toaster by EUK Catering Machinery Ltd. speeds up service

The Dixon carpet shampooing machine scrubs and dries, in fact thoroughly shampoos carpets on site, whilst the Regent floor dryer prepares floors for the Dixon floor polishers which, with attachments, can be used for sanding, smoothing and waxing.

The working kitchen of a medium-size hotel catering for a dining capacity of 50 to 75 meals is the main exhibit of the Stand of the Electrical Development Association.

Kitchen Hygiene owes much to electric cooking

PUBLIC concern about the standards of kitchen hygiene in catering establishments recently resolved itself in the report of an investigating panel. This report implied a compliment to makers of electrically-heated cooking apparatus who had contributed in no small measure to substantial improvements in this sphere.

When the story of progress in the design and manufacture of commercial cooking equipment is set down, it becomes clear that the major developments in ideas, and technique, have been achieved within the framework of the Electrical Industry itself.

Tracing briefly the essential advance from "outmoded" methods to the latest ideas of cooking by the principle of flowline production, it is apparent that the advent of gas heated equipment did away with the necessity of providing storage space for fuel and ashes and for chimneys to carry away smoke.

Then came the big step forward —cooking by electrically-heated equipment. Ducting is only required to carry away steam and cooking odours. This makes for greater cleanliness and, maintenance work is substantially reduced.

But the manufacturers did not stop at that stage of development, they then introduced heat insulation to obtain maximum efficiency and thereby virtually removed breeding places for cockroaches and other vermin. They also introduced smooth vitreous enamelled interior and exterior surfaces which are easy to clean and keep clean; this development reduced still further the possible breeding places for vermin.

The portability of electric cooking apparatus allows each piece to be placed in the best position from an operational viewpoint.

A typical example of clean, efficient apparatus is this Creda "three-oven range" at Cliff Quay power station canteen

SMALL AUTOMATIC CONTROLS

Danfoss Enters Heating and Electrical Field

IN 1933 a small Danish firm was established by Mr. Mads Clausen for the manufacture of small automatic control valves, particularly for use in the refrigeration field. Today this firm, the Danfoss Manufacturing Co., is one of the leading manufacturers of this type of quipment and has a world-wide reputation. Continuous expansion, carefully planned, and the application of all modern methods of production, together with the use of high precision and up-to-date machine tools and presses, has enabled the firm to produce items for other allied fields, particularly heating and ventilation.

Hitherto the Danfoss agents for refrigeration components in this country have been Dean and Wood Ltd., who will continue in this branch of the business, but in order to find a suitable outlet for the heating, electrical and air conditioning items, the Danfoss Manufacturing Co. has established offices at 69 Victoria Street, London S.W.1.

Range of Products

The range of products made by the company is extremely diverse. On the refrigeration side, for example, the firm manufactures automatic regulating valves for all types of refrigerants, secondary automatic valves, thermostats, pressurestats, shut-off valves, water valves and miscellaneous fittings. These have been known and used for a considerable time by many of the leading refrigeration engineering firms in this country.

It was therefore only logical that similar types of control should have been developed for use in other fields. In air pressure and water supply systems, many automatic features can be incorporated with advantage. These include pressure switches and cut-outs, water level regulators and float switches.

For heating installations, particularly those using steam, numerous automatic controls can be applied with good effect on the efficiency and ease of operation of the system. Examples of these made by Danfoss are a range of thermostats for boilers, rooms, air ducts, presses, and domestic equipment, such as electric blankets and water heaters; thermostatic valves for steam, district heating installations (of which there are several in Denmark) and water; and controls and accessories for oil burners. Again, due to the lack of natural fuel resources in Denmark, the oil-fired heating installation is widely used and the firm have thus gained considerable practical experience of the problems involved.

Electrical Equipment

On the purely electrical side, the scope is far more restricted, being confined to small switchgear and starting relays, which can be used with thermostats, pressure controls or directly by push-button control for the starting of small motors. The starting relays, for example, can be obtained in single- or triple-pole types and are usually rated at 15 amps.

Speaking at a luncheon, given to celebrate the opening of the new offices, Mr. E. Bruhn, who will be in charge of the London branch, said that Danfoss products had always been well received in this country, and he sincerely hoped that the same would apply to the heating and electrical products.

Among those present were Mr. Clausen (chairman of Danfoss) and Mrs. Clausen, Mr. E. Jones of Dean and Wood, Mr. S. Thorsen (sales manager of Danfoss) and many representatives of the trade and of the technical press.

From left to right, Mr. Clausen, Mr. W. Kirkby and Mr. E. Bruhn at the opening ceremony

Cornice Lighting Afloat

Fluorescent lighting installation in S.S. Empress of Scotland *is one of largest so far carried out in Britain's Merchant Liner Fleet*

Fluorescent cornice lighting brings charm and quiet taste to the first-class dining saloon, whilst a novel use of cold cathode tubing brings an atmosphere of luxury to the cocktail bar. This was the only instance of exposed lamps in the scheme

THE era of swinging lamps and of windjammers are past, and even the days of the filament lamp aboard ship seem to be numbered. The modern trend for lighting installations at sea is the adoption of fluorescent tubes, and more and more shipping companies are readily accepting this latest vogue. One of the most recent installations of fluorescent lamps and probably the largest scheme carried out to date, at least aboard a commercial vessel, was in Canadian Pacific Steamships Ltd.'s *Empress of Scotland*. She was, incidentally, the ship which carried T.R.H. the Princess Elizabeth and Duke of Edinburgh home from their Canadian tour. All the lighting in the main public rooms and squares has been effected by cold cathode tubes.

As a general rule, gold and ivory-coloured tubes have been used in parallel, a warm light and cheerful atmosphere being attained in this way. For special purposes, as in the case of display and shop-window lighting, natural coloured tubes have been employed. Another overall feature of the installation is that fittings have been concealed in cornices, with the result that the public very rarely see the source of light throughout the voyage. There is, however, one exception to this feature, namely in the cocktail bar, where conversely most of the tubes are exposed. The novel arrangement of that particular part of the installation is best explained by the accompanying illustration.

In all rooms it is possible to switch on either the gold or ivory tubes, or more usually, both colours at the same time. With these options available, we understand that it is a common practice just before and during dinner to have the first-class dining saloon and cocktail bar lighted only by the gold tubes. This effect is particularly pleasing, and has already gained a deal of favourable comment from passengers.

The whole scheme comprises some 6,800 ft of fluorescent tubing, the total number fitted being just over 800. The longest lamp employed was 10 ft 4 in., and the shortest 4½ ft, and altogether 217 transformers were required for the supply of electricity to those lamps.

One of the biggest advantages which Canadian Pacific have found, as indeed have other companies switching to fluorescent lighting, has been the increased efficiency over tungsten, which has resulted in a substantial reduction of heat losses from the lighting. This is important for ships operating in tropical waters, as the *Empress of Scotland* does now—interchanging her Liverpool-Canada runs with southern cruises. The above installation was carried out by Claude General Co. Ltd.

overseas news

More Trouble

Sydney, N.S.W., was again the scene of widespread and prolonged blackouts earlier this month. The supply interruptions were caused by breakdowns of plant at Balmain, White Bay and Bunnerong power stations. Mr. H. G. Conde, State Electricity Commissioner, has said that a 15,000 kW generator at Balmain was put out of commission. Later, the output of a 25,000 kW set at White Bay was reduced to 10,000 kW because of a partial breakdown, and troubles were increased when a 50,000 kW unit at Bunnerong broke down the following morning. Everything seems to happen to Sydney!

Melbourne Railway Contract

The Victorian Government has announced that it has contracted with the English Electric Co. Ltd. to supply electrical equipment, valued at £(A)1,250,000, for new carriages for Melbourne's suburban electric railway system, Reuter reports.

Tully Falls

Work began this month on the first stage of the Tully Falls hydro-electric scheme, Queensland, which will have an ultimate capacity of over 70,000 kW, although the first stage, on which preliminary work has just started, would be only about a third of that figure.

Tully Falls are one of the scenic glories of the Atherton Tableland in Northern Queensland. The Tully River winds its way through densely timbered jungle before taking its plunge of 1,000 ft in an almost vertical drop, after which it continues along Tully Gorge, the walls of which are almost 2,000 ft high. The scheme involves building a dam seven miles above the falls and a diversion-weir a few hundred yards above them from which a tunnel and penstock will take the water to a power house in the gorge below. Later stages provide for the duplication of the main power station and the construction of smaller ones where the Nitchaga and Cochable creeks join the Tully. Transmission lines will link the new source of power with the existing Cairns distribution system.

Clarence Gorge

Proposals for a major dam in the Clarence Gorge formed part of a comprehensive technical report on all aspects of the use of the natural resources of the Clarence Valley, the New South Wales Deputy Premier and Minister for Works and Local Government, Mr. J. J. Cahill, declared recently. He was replying to a statement suggesting that the State Government should use its available funds for hydro-electric development in the Clarence River gorge instead of spending money to acquire power stations from the Sydney County Council.

N.S.W. Hopes

Now that the power stations formerly owned and operated by the Sydney County Council have been taken over by the Electricity Commission of New South Wales, as from this month, local eyes are watching the scene in an effort to discover a change in outlook or tempo in the industry, it would seem from reports. Government spokesmen justified the transfer on the ground that divided control between four major generating authorities led to high overheads, manpower wastage and bad forward planning, and it is evident that the public is hoping that better service and fewer blackouts can now be achieved together with economy. Certainly the outlook for the Commission is brighter, with the prospect of a big increase in generating plant during the year, notably at Pyrmont and Bunnerong, apart from the "packaged" plant on order from the United States.

Pulp and Power

British Columbia is to have another multi-million dollar pulp mill linked with a major hydro-electric development. Plans for a $35,000,000 development are now being drawn up and some of the details have been made known. The plans call for the construction of a $19,000,000 mill by Western Plywood Co. in the Quesnel area in north-central British Columbia, 400 miles north of Vancouver. The mill will be supplied with power from a project planned by the British Columbia Power Commission at a cost of $16,000,000. The power project—planned for 150,000 h.p.—will be built in two stages on the Quesnel River. The first stage, including dams, will cost $10,000,000.

Manitoba Views

The Manitoba Power Commission, in the opinion of Premier D. L. Campbell, is "in a better position with respect to power supplies than any other electric utility in the whole of Canada." He said the Manitoba Hydro-Electric Board has completed engineering surveys for a modern steam stand-by plant to be erected when required within a short distance of Brandon.

B.C. Expansion

The expenditure of $31,300,000 during 1951 in improving and expanding its electric, gas and transport services is planned by the British Columbia Electric Co. (a subsidiary of the British Columbia Power Corpn.), Mr. A. E. Grauer,

president, announced last Friday. During the past six years the company has spent $140 million on expansion and improvement, and it is intended to spend a similar amount over the next five years. The largest single item in the 1952 allocation is $6,500,000 to complete the 80,000 h.p. Walleach Lake hydro-electric plant at the eastern end of the Fraser Valley, while another $3 million will be spent on the erection of a h.t. transmission line to take power to Vancouver. Nearly $1,500,000 is also earmarked this year for expenditure on work at Vancouver Island.

Another Commission?

A suggestion that the people of the Maritime Provinces could and should be served better and at lower cost with electricity by a Maritime Power and Hydro Commission owned by the Maritime Governments, was made this month by the P. E. Island Federation of Agriculture meeting in annual session. The resolution covering the suggestion urged "the Provincial Government to arrange for a survey and make a public report on the possibilities of generating and distributing electric power . . . under some form of a Maritime Power and Hydro Commission jointly owned and operated by the three Maritime Governments."

Israel's Need

Talks began recently between the Israeli Government and the directors of the Palestine Electric Corporation on the possible expansion of Israel's electric power supply. Fears that the present and potential resources of the Corporation are insufficient to meet the rapidly growing consumer and industrial requirements prompted the Government to arrange the talks. Within the next five years, Israel, it is estimated, will need 500,000 kW. A new generator producing 50,000 kW is expected to begin operating in Tel Aviv later this year, and two more of the same size in 1953. These, however, will not meet the growing demand and, if the directors of the Corporation decide that they cannot raise sufficient new capital abroad, the Government will probably invest funds in the Corporation from the U.S. grant or the bond drive, it is reported.

Power Schemes

Loans by the Government of India for the river valley schemes during the current year have been increased to Rs. 240·2 million. Out of this, a sum of about Rs. 400 million (an increase of about Rs. 100 million) has been allotted to the four big river valley schemes which are financed by the Centre—the Damodar Valley project, the Hirakud project, the Bhakra-Nangal project and the Harike scheme. Of the increased allotments the largest share will be spent on the Bhakra-Nangal scheme. A sum of Rs. 140·2 million has also been advanced to the State Governments. This includes Rs. 15 million to Mysore for power projects, Rs. 5 million on the Madhya Pradesh power schemes and Rs. 6·2 million for similar work in Orissa.

E. Bengal Schemes

Electrification schemes for Brahmanberia and Chandpur in East Bengal, Sialkot and Lyallpur in Punjab, were considered and approved at the current meeting of the Planning Commission. The Commission also decided to set up an expert committee to determine the economic sale rates of electric power which would be supplied by the Rasul hydro-electric project when it begins to operate in March next. As regards the three major hydro-electric projects of Warsak, Karnafulli and Mianwali the Commission came to the decision that further expert examination of the projects should be undertaken and its results submitted to the Commission within three months.

New Austrian Plant

Plans have been drawn up for the construction of a new hydro-electric power plant to be built at Schwarzach, near Salzburg. Planned capacity is about 410 million kilowatt-hours per year and it is anticipated that the installations would take four years to complete, according to reports.

Mexico's Power Plans

The International Bank for Reconstruction and Development has made a 25-year 4½% loan of $29,700,000 for electric power development in Mexico. This is the Bank's third power loan to Mexico and will finance imports of equipment and materials for seven projects in the 1952-55 programme of the Mexican Federal Electricity Commission.

Main project is the construction of a 150,000 kW hydro-electric station at Tingambato in Mexico State. A 55,000 kW station will be built at El Cobano in Michoacan State.

Thermal power stations of 30,000, 10,000, 2,500 and 4,000 kW respectively will be built at Monterrey, Vera Cruz, La Paz and Motul in Yucatan, where power is needed for hemp processing plants. The Motul station will burn hemp bagasse, formerly treated as waste.

The loan will also help the extension of distribution systems in Sonora, where agriculture and fisheries have recently made great progress.

The three loans will have raised Mexican power capacity from 1,000,000 kW in 1948 to 1,850,000 kW by 1955, when repayment of the loans begins.

Order for Alaska

We have heard much of the efforts of British manufacturers to obtain orders in America for power station plant, but now comes news that the United States Government has placed an order with Oerlikon, of Zurich, Switzerland, for two 15,000 kW generators. These are to be installed in the power station of Eklutra, in Alaska, which is now under construction. According to the report, the U.S. Government will save about $250,000 by ordering these generators from Switzerland instead of having them made in America.

PERSONALITIES

IN THE INDUSTRY

Since 1947 on the sales staff of Enfield Cables Ltd. as area manager for the Midlands and South-Western Counties, **Mr. A. J. Betts,** A.M.I.E.E., has now been appointed home sales manager and assistant to the associate director of home sales of that company. He will operate from Southampton Row, London. Mr. Betts served an engineering apprenticeship with the English Electric Co. at Stafford from 1932 to 1936, and, after a period in the Switchgear Department, joined Johnson and Phillips Ltd. in 1937 as a switchgear sales engineer. He transferred to their Birmingham branch in 1946, and joined Enfield Cables the following year. The latter company also announce that **Mr. H. B. Davies** has been nominated home estimating manager.

Mr. A. J. Betts

Formerly shift charge engineer at Battersea generating station, **Mr. P. Holt,** A.M.I.E.E., A.M.INST.F., has been appointed deputy station superintendent at Plymouth "B" power station.

Mr. John Oldham, O.B.E., J.P., chairman and joint managing director of Oldham and Son, Ltd., left for South Africa last Thursday in the *Capetown Castle* for important discussions in Johannesburg on present and future developments of his firm's associate company there, Oldham and Son (Africa) Ltd. He will be away about two months.

From the Watford Electric and Manufacturing Co. Ltd. we learn that **Mr. J. L. Lawson,** who joined the company in 1904, has retired from the executive position of works manager. The benefit of his extensive experience is still available to the company, for he remains a director. Three new appointments are also announced by the company. **Mr. Arthur C. Gascoine,** who joined the company in 1908, has become managing director; **Mr. E. Nobbs,** who, with over 30 years' service, has been production engineer since 1946, is now works manager; and lastly, **Mr. H. V. Swabey,** who joined the company in 1912, and was latterly works superintendent, becomes a member of the board and is appointed production manager.

Mr. L. Mandeno, B.E., M.I.E.E., M.N.Z.I.E., who has been consulting engineer to the Bay of Islands Electric Power Board, New Zealand, since its inception, is to relinquish that position at the end of March next. The Board's area now amounts to over 2,600 square miles.

Mr. G. Lyon, M.SC. (ENG.), A.M.I.E.E. M.AMER.I.E.E., who has been engineer-in-charge Network Analysis Department of Associated Electrical Industries Ltd., for the past five years, has taken up an appointment with Merz and McLellan, the consulting engineers, at Newcastle-upon-Tyne.

Mr. E. C. Holroyde, whose election as chairman of C.M.A. we noted last week, is vice-chairman of Crompton Parkinson Ltd. (not chairman).

The Liverpool District Office of the British Thomson-Houston Co. Ltd. is again to have a full-time manager resident in the district. He is **Mr. G. W. Johnson,** B.SC., A.M.I.E.E., A.M.I.MECH.E., who is no stranger to the district, having served under Mr. A. B. Race's management in the Manchester/Liverpool area since 1945. Mr. Johnson served a post-graduate apprenticeship with B.T.H. during 1928-31, and then joined the construction staff. At the outbreak of the last war, he had been located at the B.T.H. Willesden works as switchgear sales engineer for three years. From 1939 until 1943 he saw active service in H.M. Forces overseas, being twice mentioned in despatches. He was promoted Major in 1943 and appointed D.A.D.M.E. (War Office). Mr. A. B. Race, of course, continues his managership of the B.T.H. Manchester district office, a position he has held from 1930.

Mr. G. W. Johnson

Mr. L. E. Saker, who has over 40 years experience with Lancashire Dynamo and Crypto (Mfg.) Ltd., has been appointed chief engineer of the Willesden works of that company. He is chairman of the Design Committee at Willesden and was for many years chief a.c. designer. In his new capacity he will be responsible for the design and performance of the complete range of products manufactured at the Willesden works—a function which he has, in effect, been carrying out over the past few years.

Mr. L. E. Saker

Mr. Peter E. M. Sharp, A.C.G.I., B.SC. (Eng.), A.M.I.E.E., has left the Council of Industrial Design, where he was responsible for the selection and organisation of communications and electronic exhibits at the Festival of Britain. He has now joined the Commercial Department of the Telegraph Construction and Maintenance Co. Ltd., with whom he is specialising in communications cables and systems.

Mr. John R. Ratcliff, B.SC. (Eng.), M.I.Mech.E., M.I.P.E., hitherto engineering works manager of K. and L. Steelfounders and Engineers Ltd., has been elected to the board of that company as engineering works director.

Owing to the many calls on his time and the necessity to curtail long-distance travelling, **Lord Riverdale** has found it necessary to resign from his seat on the boards of The Telegraph Construction and Maintenance Co. Ltd. and the Selborne Plantation Co. Ltd.

We learn that **Mr. Basil J. Smith,** a son of the past chairman of Smith Meters, Ltd., the late Mr. E. W. Smith, has been appointed to the board of that company.

Two overseas appointments are announced by Metropolitan Vickers Electrical Export Co. Ltd. The first is that of **Mr. J. A. MacLean,** B.SC., A.M.I.E.E., as representative in Canada, and the second concerns **Mr. W. Bailey,** Grad.I.E.E., who becomes manager in Portugal. Mr. MacLean was educated at Dingwall Academy and Glasgow University. He joined the Metropolitan-Vickers Electrical Co. in 1937 and prior to his transfer to the M-V. Export Co. in 1946 was in charge of the mining and oil industry section of Motor Sales Department. He has toured East Africa, the Sudan and Canada on behalf of the Export Co. Mr. Bailey, who was born in Lisbon in 1918, went to the Trafford Park works as a college apprentice in 1939. In 1940 he joined the R.N.V.R. as Electrical Lieutenant and served with great distinction in the Mediterranean and North-West Europe, being awarded the D.S.C. and G.M. and Bar. Returning to Metrovick in 1946, Mr. Bailey completed his apprenticeship, and since 1948 he has been a sales engineer in the company's Lisbon office.

Mr. J. A. MacLean

Mr. W. Bailey

Just appointed works engineer to E.M.I. Factories Ltd. is **Mr. R. E. Leakey,** who succeeds **Mr. A. J. K. Parker.** Mr. Leakey has had over 25 years' service with companies in the E.M.I. group. Since 1942 he has been manager of the Production Engineering Department. Earlier he had travelled widely in Europe, the Middle East and Australia, to supervise the modernisation and building of various of the E.M.I. factories overseas.

Mr. R. E. Leakey

Dr. C. J. Smithells, M.C., director of research for the British Aluminium Co. Ltd., has been elected president of the Institute of Metals.

We hear from Thorn Electrical Industries Ltd. that **Mr. George Gibson** has joined the Board of their subsidiary company, George Forrest and Son Ltd., of which he has been general manager. Mr. Gibson has held important executive positions for the past twenty years and has been connected with the aircraft, light engineering and electrical industries for thirty years. After serving an apprenticeship as a sheet metal worker and coppersmith, his first appointment was with the Royal Aircraft Establishment, Farnborough, where he was engaged on experimental aircraft work for six years. He was loaned to the Admiralty and took charge of the construction of the hull of the R.33 Airship for Messrs. Armstrong Whitworth. Subsequently he became works superintendent for Briggs Bodies, Dagenham, when that firm started up in this country, and was for seven years responsible for organising labour and production, later becoming general manager on government contracts with Richard Crittall and Co. and a director of two of their subsidiary companies. Mr. Gibson has had several years experience in the manufacture of special lighting fittings for installation in prominent buildings, liners and tankers.

Mr. G. Gibson

Director of engineering to Murphy Radio Ltd., **Mr. K. S. Davies,** B.SC., A.M.I.E.E., has been elected chairman of the Radio Communication and Electronic Engineering Association for the ensuing year. The new vice-chairman is **Mr. C. G. White,** director and general manager, marine division, Kelvin and Hughes Ltd. The Council of R.C.E.E.A. is: B.T.H. Co. **(Mr. V. M. Roberts);** E.M.I. Ltd. **(Mr. J. S. Carr);** G.E.C. **(Mr. M. M. Macqueen);** Kelvin and Hughes **(Mr. C. G.**

White); Marconi's W.T. Co. (Mr. F. S. Mockford); Met. Vickers (Mr. L. H. J. Phillips); Mullard (Mr. T. E. Goldup); Murphy Radio (Mr. K. S. Davies); Plessey Co. (Mr. P. D. Canning); Pye Ltd. (Mr. C. O. Stanley); Redifon Ltd. (Mr. B. St. J. Sadler); and Standard Telephones and Cables (Mr. L. T. Hinton).

Mr. A. J. Brunker, B.Sc.(Eng.), A.M.I.E.E., general export manager of E. K. Cole Ltd., who has just returned from a business visit to South America, has now been made additionally responsible for the commercial activities of the Electronics Division of the company. The expanding Ekco business in this field embraces Electronic equipment for industry, V.H.F. communication equipment, radar and nucleonic devices. Mr. Brunker will be supported by **Lord Waleran,** who is commercial manager of the Company's Electronics Division.

Mr. A. J. Brunker

Although nominated by the Institute of Cost and Works Accountants to serve as a member of an Anglo-American Productivity team to study fuel conservation in America, **Mr. D. Bellamy,** O.B.E., D.L., F.A.C.C.A., F.C.W.A., Comp.I.E.E., F.S.S., sub-area manager of No. 6 sub-area of the Yorkshire Electricity Board, has now declined the invitation, we understand. The reason given, is that "an important man like Mr. Bellamy must remain to assist the new chairman (Mr. J. S. Pickles) who wants all the support he can get from his senior executives just now," an official of the Board is reported to have stated.

Mr. William Findlay, B.E.M., until recently a Glasgow district manager for Hoover Ltd., has been appointed Midland branch manager for the company with headquarters at Birmingham.

Mr. T. W. Heather, sales director of the General Electric Co. Ltd., recently left London Airport on the first stage of a business tour of the Sudan, Uganda and Kenya. He is expected to return at the end of Feburary.

Mr. D. J. Tamblyn, A.M.I.E.E., who resigned recently from the Contracts Department of Foster Transformers and Switchgear Ltd., has joined the sales staff of Bepco Canada Ltd., the Canadian associates of the Lancashire Dynamo group. He has been appointed to the sales staff of the head office of Bepco in Montreal.

Mr. A. G. Hunneyball, personnel manager with A. Reyrolle and Co., Ltd., Hebburn-on-Tyne, for three years, has been appointed University liaison officer with British Insulated Callenders' Cables, Ltd. His duties are to visit universities and technical colleges to select candidates for technical appointments with the firm. He was formerly with the Phoenix Telephone and Electric Works Ltd.

Dewrance and Co. announce that **Sir Eric Mieville** has been appointed a director and chairman of the board in succession to **Mr. H. Forbes-White,** who has resigned.

Professor Alan Burn, professor of engineering at the University of Tasmania, has been appointed an associate commissioner of the Hydro Electric Commission of Tasmania.

OBITUARY

Mr. H. W. Perry, at one time outside representative and in later years on the inside staff of W. Canning and Co., died on January 14, aged 65.

Mr. Pat Markham, T.D., welfare officer to the South-Eastern Electricity Board, and editor of the Board's magazine, *Sea Board*, died on January 9, aged 40. Prior to nationalisation he was welfare officer to the former L. and H.C.J.E.A.

Col. George Bray, M.C., T.D., chairman and managing director of Geo. Bray and Co. Ltd., of Leeds, died on January 4, aged 63. The firm was founded by his father in 1863 and Col. Bray joined it at the age of 17. He was a former president of the Yorkshire section of the Institute of Production Engineers, and a member of the Council of Leeds University. His other interests included chairman of the board of governors of East Moor School, Leeds, and founder member and treasurer of Leeds Housing Trust.

Mr. C. H. Goulden, M.C., A.M.Inst.C.E., A.M.I.E.E., A.M.I.Mech.E., of Bognor, and previously of Thames Ditton, who for a time practised as a consulting engineer, died on January 20.

Mr. W. Dawson Hopkins, M.I.E.E., who retired in September, 1947 from the position of chief electrical engineer at the head office of the British Engine Boiler and Electrical Insurance Co. Ltd., died on January 19. He joined that concern in August 1912, and for a time was chief electrical engineer for the London area. Trained at the Dick Kerr Works, Preston, he later served with the Harland Engineering Co. Ltd.

Mr. John McFarlane, secretary of the N.B. Electrical Welding Co. Ltd., died at Motherwell recently. He was for many years previously secretary of British National Electrics Ltd.

Mr. J. F. Stewart, late managing director of the International General Electric Co. of New York, Ltd., died in London on January 17, aged 67.

Mr. E. T. Overton, joint managing director of the Delta Metal Co. Ltd., died on January 18, aged 70.

Mr. C. E. Schwenger, chief engineer for the Toronto Hydro Electric System, died on January 14, aged 64. He served with the Hydro System for 41 years.

Vigilance of Fair Trading Council

AS the only body which affords the opportunity for the various sections of the electrical industry to discuss its several trading problems and reach a common measure of agreement, the Electrical Fair Trading Council naturally plays an important part in the commercial life of the industry. The year just ended proved an important one for the Council, too, in that the Government's plan to abolish resale price maintenance was issued. In the belief that the effect of the proposals contained in the whole paper would be inimical to the interests of the general public and detrimental to the efficient conduct of the electrical industry, in particular, the Council formed a special action committee to deal exclusively with the matter, it is stated in the Council's annual report, just issued. In this it is announced that Mr. V. Watlington and Mr. T. W. Heather have been re-elected for the seventh year in succession as chairman and vice-chairman respectively.

Price Maintenance

Views were exchanged with other technical industries with problems similar to the electrical industry, and, as we have already reported, a case was submitted to the Board of Trade on behalf of the entire industry, seeking exclusion of electrical products from the scope of the legislation proposed. The B.o.T. has acknowledged this statement intimating that careful consideration will be given to the submission.

During the past year a number of changes have taken place in the Fair Trading Policy, notably a new Schedule 2 covering ornamental and decorative lighting fittings.

Oral evidence was also given by the Council to the Monopolies Commission on the operation of the principles of the Fair Trading Policy in respect of electric lamps to other electrical products, and, judging from that Commission's report, it is now realised that some of the wording in the "aims and objects" of the Policy is capable of being misunderstood. To minimise future risk of misinterpretation, the wording is being further examined.

As yet no substantial progress has been made in the establishment of a Fair Trading Policy in Australia, South Africa and New Zealand, although representatives of the various sections of the electrical industries in those countries have been regularly advised of all matters and activities likely to be of interest. It is evident that there is a keen desire to follow Britain's lead, and Australia appears to have made the greatest headway in this matter.

Finally, it should again be emphasised that the Electrical Fair Trading Policy is entirely a voluntary scheme, which continues to receive strong support from the entire industry as the approved commercial trading code for electrical products. The Policy itself is not static, a number of changes having been introduced to keep abreast of new developments and to meet changing conditions in the electrical industry.

TUBING FOR FLUORESCENTS

THREE and a half miles of fluorescent lamp tubing hour is the output capacity of the new Firhill, Glasgow, factory of Chance Bros., Ltd., which, as we noted last week, was recently opened by the Rt. Hon. James Stuart, P.C., M.C., M.P., the Secretary of State for Scotland. Tubing available as a result of the development is expected to turn Britain from an importer to an exporter of this product.

Operational principle on which the plant operates is the "Vello" process, conceived in France and developed in the United States. Glass is made in a furnace with a capacity of 250 tons/week, and from the furnace it flows through a 24 ft long channel where it is heated up to the temperature required for tube drawing. The hot glass then passes through a metal annulus consisting of an inner funnel and an outer cylinder. Air is blown down a hollow shaft at the centre of the funnel to inflate the glass and maintain it in its tubular form.

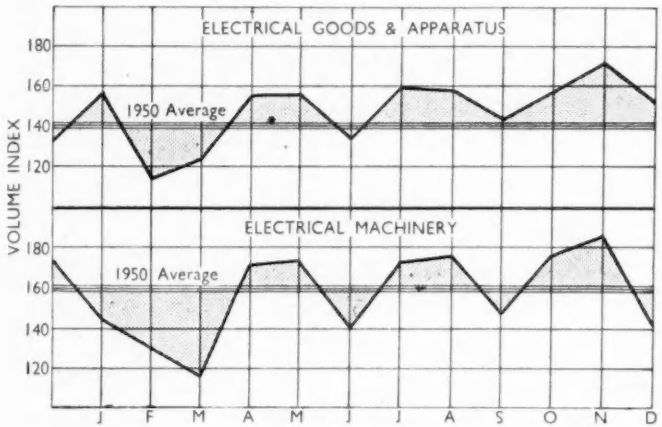
At this stage, the glass is falling vertically. Its direction is changed to the horizontal by allowing it to fall in the form of a catenary with a 20 ft horizontal dimension. In the course of changing direction the glass is stretched, and by the time it has reached its horizontal runway, its diameter has been reduced, without distortion, to the final tube dimension.

The runway carries the tubing to a hot cut machine, which cuts off required lengths by heating a narrow band of glass and then suddenly chilling it. Each tube then falls on to a conveyor belt, and moves through a machine which automatically measures its diameter and rejects any tube of incorrect dimensions.

On another floor of the factory the tube ends are cut to the exact lengths required and smoothed down in a flame. Where required, a special machine automatically shapes both ends of the tube.

Speed of production is such that full inspection methods cannot be applied, and so statistical quality control techniques are utilised at several stages of manufacture to ensure that the end product is kept within the necessary close tolerances. The achievement of such close limits together with high speed automatic production is the special advantage claimed for the Vello process over other methods of drawing glass tubes. Operation is essentially continuous, with shut down only at intervals of some months.

EXPORTS AND IMPORTS



EXPORT VOLUME INDEX

December figures for exports showed the drop that is normal in this month as a result of the effect of Christmas holidays on the number of working days. In the case of electrical goods and apparatus exports dropped sharply from the November record to a value of £7,704,507, some £2 m. less. This is equivalent to 132% of the average volume of similar goods in 1947, after allowing for changes in prices.

Electrical machinery exports fell in values about £1.3 m., and as a result the comparable volume index was 141% of the 1947 base.

THE normal seasonal drop in exports affected electrical goods last month, along with most other manufactures. The total value of £12,104,250 of all electrical apparatus sent abroad in December was over £3½ million below the record November figure. It is interesting to note that cooking and heating appliances are maintaining their high monthly averages. Of last month's figure of £482,206, electric flat irons alone accounted for £94,516. Washing machine exports are also steadily advancing. In December, 31,620 complete machines valued at £747,499 were sent abroad, making a total of 303,115 machines amounting to £6,963,877 for the year. Portable electric tools exported last month totalled £104,641 against £103,588 in November.

Description	Exports Value Month of December			Imports Value Month of December		
	1949	1950	1951	1949	1950	1951
	£	£	£	£	£	£
Telegraph and Telephone Wires and Cables—						
Submarine	106,621	143,622	79,091			
Other	777,761	642,176	341,100			
Rubber Insulated	262,793	365,494	628,291	12,519	4,375	20,381
Insulated, other than Rubber	790,633	728,728	826,854			
Wireless Apparatus, including Valves	933,480	1,537,605	1,662,700	115,806	204,560	273,181
Telephone and Telegraph Apparatus	1,353,254	1,170,480	1,112,798	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament Lamp Bulbs	111,119	102,959	120,035	13,863	21,516	10,054
Other Descriptions	303,148	265,451	393,829	28,582	36,743	39,445
Batteries (primary)	81,173	156,438	247,647	—	—	—
Accumulators, Portable	213,100	205,397	427,920	—	—	—
" Stationary	34,076	21,705	56,033	—	—	—
" Parts and Accessories	104,880	52,663	90,715	—	—	—
Electrical Cooking and Heating Appliances	219,657	295,399	482,206	—	—	—
Ammeters, Voltmeters, etc., and Parts	90,296	111,638	100,612			
House Service Meters	62,522	110,297	121,651			
All Other Instruments	102,041	136,433	81,277	40,255	28,528	89,024
Electro-Medical Apparatus	29,735	43,840	39,401			
X-Ray Apparatus, etc.	129,105	112,713	143,511	26,184	14,559	45,334
Insulating Materials	152,284	169,334	234,993	—	—	—
All Other Articles	414,551	369,254	513,843	109,306	103,803	111,172
Total of Group	6,271,499	6,741,626	7,704,507	346,515	414,084	588,591
Electrical Machinery:—						
Generating Sets (Diesel)* Not exceeding 200 kW		996,255	237,294			
" " " Exceeding 200 kW	637,367	165,454	130,448	25,214	30,634	80,973
Other Generating Sets		328,167	293,388			
Generators minus Prime Movers, and Parts†		136,309	486,116			
Motors	641,585	744,255	788,858	25,775	18,486	31,731
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	1,668,166	1,774,683	1,774,108	23,456	8,150	12,227
Fans, Electrically and Power Driven	160,909	100,003	176,478	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	264,163	350,738	513,053	—	—	—
Total Appliances and Machinery	9,643,689	11,337,490	12,104,250	420,960	471,754	713,522

* 1950 figures include generators minus prime movers. † 1950 figures for parts of generators only.

The BUYER'S *Column*

Insulation Tester Reintroduced

IN response to requests from the radio and electrical trade at home and abroad, TAYLOR ELECTRICAL INSTRUMENTS, LTD., 49 Montrose Avenue, Slough, Bucks., have reintroduced their Model 130A insulation tester. This mains-operated ohmmeter covers insulation and medium values of resistance and is suitable for workshop tests or for routine checking of components.

Taylors new model 130A

A robust moving coil meter is used fitted with a 4-in. scale and knife-edge pointer. Two ranges are provided the higher covering 200,000 ohms to 1,000 megohms at a test pressure of 500 V and the lower covering 20 ohms to 100,000 ohms at a test pressure of 50 millivolts.

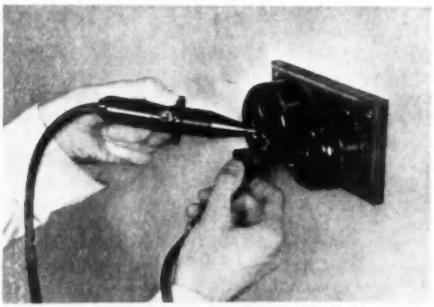
One of the most interesting features of the Model 130A is the press switch which is fitted for rapidly charging capacitors. The net trade price of Model 130A is £12 15s.

Philips Neon Voltage Indicators Back

JUST reintroduced by PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London W.C.2, are two neon voltage indicators for testing low- and medium-voltage installations.

The popular pencil type, Cat. No. Q.5000, is priced at 5s., list, and can be used on a.c. or d.c. mains voltages between 110 and 500. It is housed in a black insulating pencil-shaped case, with a pocket clip.

The voltage and polarity indicator, Cat. No. Q.5005, is a larger type suitable for 80-750 V a.c. and 100-750 V d.c., and for indicating polarity on d.c. It has two black "Philite" moulded insulated test prods, fitted with collars to prevent accidental hand contact with the metal probes, joined by a 39-in. length of tough rubber-covered cable. One prod houses a Type 4017 indicator lamp, which can be replaced. List price is 30s. Supplies of both types are available immediately.



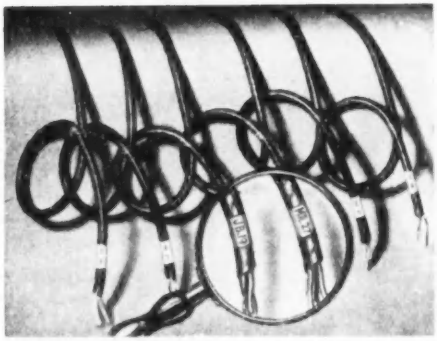
Polarity testing becomes a simple, safe matter with Philips' new Q.5005 unit

Self-Adhesive Tapes Aid the Industry

THE electrical and radio industries are but two of our many industries which have benefited from the use of self-adhesive tapes.

In the supply of such material INDUSTRIAL TAPES LTD., Speedfix House, Dukes Road, London W.C.1, are now specialists. It is therefore interesting to survey the range of uses of this material.

In the making of complicated circuit diagrams and delicate apparatus, Speedfix tape wins hands down, for it requires a few seconds' care and obviates many messy minutes with paste or water. For holding component parts together temporarily during construction or transit Speedfix transparent tape has proved ideal. Either acetate or ethyl tapes are suitable in situations where high pressures and currents are involved, for acetate tape has a dielectric strength of 5,000 V and an insulation resistance of 15,000 megohm, and ethyl tape figures are 5,000 V and 30,000 megohm respectively.



Marking flexible leads is one of the uses of Speedfix and Bondex tapes

Paper masking tapes are widely used for holding applications, whilst Speedfix cloth tape is also suitable where extra tensile strength is required.

Bondex tape has been specially produced for labelling, because a complete protection to the wording is achieved, for the printing ink is sandwiched between two layers of cellulose tape.

Industrial Tapes also supply an excellent electrical insulating tape which is manufactured by a spreading process whereby each side of the basic

material is coated with two coats of insulating material before the adhesive is applied to both sides. Thus it always remains adhesive, whilst pinholes in the fabric are eliminated. It is strong and is clean to handle.

S.L.92 Signal Lampholder is New

DESIGNED by the manufacturers, ARCOLECTRIC (SWITCHES) LTD., Central Avenue, West Molesey, Surrey, to meet the demand for a totally enclosed signal lamp that can be mounted in a small diameter fixing hole, the signal lampholder S.L.92 has now been made available to industry at a list price of 2s. 8d. each.

Suitable for normal m.e.s. lamp bulbs, 2-12 V, with glass envelope diameters up to 11 mm, the S.L.92 can be fixed in a single hole $\frac{3}{8}$ in. diameter clearance in a panel up to $\frac{1}{8}$ in. The coloured lens supplied in red, green, amber and other colours have a chromium bezel and are interchangeable. The insulation used has been flash tested to withstand 2,000 V. Connections are made by means of solder tags provided.

Prices are Still Rising !

CONTINUING in the unfortunate trend brought about by the current economic situation, more firms have found it necessary to announce increases in the prices of their goods.

THE ENGLISH ELECTRIC CO. LTD., Queen's House, Kingsway, W.C.2, announce increases in the list prices of certain domestic appliances and their spare parts with effect from Monday, January 14.

The appliances affected are:—

	£	s.	d.
2009 Cooker, complete with fuses, simmerstat and oven thermostat	37	15	0
Extra for unheated drawer	1	17	6
4002R Washing machine	58	10	0
Plus Purchase Tax	30	8	5
5500 Food mixer	14	11	0
Plus Purchase Tax	7	5	6
Attachments:—			
Juice extractor	1	19	0
Plus Purchase Tax		9	9
Mincer and power unit	4	17	6
Plus Purchase Tax	1	4	5

Spares prices will be increased as under:—
Cooker spares list prices increased by 5%.
Food mixer spares list prices increased by 5%.
Washing machine spares list prices increased by $7\frac{1}{2}$%.

H.M.V. HOUSEHOLD APPLIANCES division of the Gramophone Co. Ltd. also announce increases as from January 16.

The appliances affected and the new prices, including purchase tax, are as follows:—

	£	s.	d.
Portman reflector fire FRF.1	7	7	6
Portman reflector fire FRF.2	9	4	9
Welbeck reflector fire FRH.1	8	7	5
Welbeck reflector fire FRH.2	10	7	4
Cavendish heater HC.2	18	13	0
Hair dryer HD.1	9	1	3
Upright toaster TU.1	4	4	0
Iron stand No. 2 IS.2		8	6
No. 5 iron IC.5AC	3	7	6
No. 5 iron IC.5AC/DC	3	12	6
No. 6 heavy-duty iron IC.6AC	3	17	6
No. 6 heavy-duty iron IC.6AC/DC	4	2	6

THORN ELECTRICAL INDUSTRIES LTD., 105 Judd Street, London W.C.1, advise that the list prices of all Atlas fluorescent fittings have been advanced by 5% as from January 14.

The list prices of all switch and fuse gear appearing in Catalogue 776/3/51, issued by REVO ELECTRIC CO. LTD., Tipton, Staffs, have been increased by 20% as from the same date. Whilst SMALL ELECTRIC MOTORS LTD., Eagle Works, Churchfields Road, Beckenham, Kent, announce increases in their motor prices of 10% effective from January 1.

Owing to large increases in the prices of raw materials used in the manufacture of their "Floodwarmth" and "Evenwarmth" heaters and thermostatic control gear, UNITY HEATING LTD., Chilworth Manor, Southampton, announce that as from Monday, January 21, all prices will be increased by varying amounts, the average increase being in the region of 10%.

TRADE PUBLICATIONS

AIR-BREAK FUSE GEAR.—A wide range of outdoor and indoor high and low tension air-break switch and fuse gear is given in the 17th edition of section X (2) of the General Electric Co.'s catalogue, which has recently been issued, and is available from Magnet House, Kingsway, London W.C.2.

DUST COLLECTING.—Self-contained unit dust collectors using a filter fabric for air cleaning are the subject of a folder we have received from the Harris Engineering Co., York Works, Browning Street, London S.E.17.

LIGHTING FITTINGS.—Revised price lists have been issued by Revo Electric Co. Ltd., of Tipton, Staffs, covering their lighting equipment catalogue No. 17 and the fluorescent lighting fittings catalogue No. 744. A leaflet dealing with industrial reflector fittings has also been sent us.

TAPS AND DIES.—Stock list No. 5, received from Alfred Herbert Ltd., of Coventry, gives brief details of a wide range of taps, dies and chasers, available from that company.

AIR BLAST CIRCUIT-BREAKERS.—H.V. switching stations incorporating air blast circuit breakers form the subject matter of a recent publication by the English Electric Co. Ltd., Switchgear Dept., Stafford.

FLAG MARKERS.—A leaflet describing the new Hellermann flag marker made from polyvinyl chloride for identifying small wires and cables has been issued by Hellermann Electric Ltd., Tinsley Lane, Crawley, Sussex.

ELECTRICAL CONTACTS.—Two new data sheets dealing with Johnson Matthey services to the electrical engineer have been revised. Sheet 2320 describes the characteristics of the materials for several common contact and switchgear application. Standard ranges of headed contacts listed in the new version of data sheet 2321 now provide a wider choice for the designer. Both are available from Johnson, Matthey and Co. Ltd., 73/83 Hatton Garden, E.C.1.

THE WEEK

COMMERCE *in news* INDUSTRY

New Tariff Proposals Approved

PROPOSALS for increased domestic and commercial tariffs for the S.E. Scotland area, due to take effect as from April 1, were approved by the Consultative Council at their recent meeting in Edinburgh. It was likely, however, that the Board would receive further information from the Central Authority concerning possible future increases in the cost of bulk supplies, it was stated, and the Board might have to reconsider the proposals in the light of that information. Following the Council's meeting, the chairman said they were satisfied that tariffs had to be increased to the extent recommended and that the suggestions represented an equitable distribution of the burden.

E. Midlands' Tariff Revision

AT a special meeting of the E. Midlands Consultative Council last week, the proposals for increased tariffs in the area were accepted "as inevitable." A further resolution was passed seeking powers to enable the Council to investigate the costs of the B.E.A., so as to ensure that their charges were fair and reasonable. This arose from the observation that some 65% of the Board's total revenue was needed to meet the B.E.A.'s charges for electricity supplied in bulk. In a letter to the Council, the Board pointed out that increased coal prices raised the cost of electricity by about £1¼ million. About half of this could be recovered by industrial consumers. In addition, rises in wages and salaries had meant an added annual expenditure of over £200,000. Revised tariffs are due to become operative as from the first meter read after April 1. In the new rates, the secondary charge on the domestic tariff is increased from ¾d. to ⅞d., and a similar rise applies to the unit charge of commercial 2-part, of flat rate and block tariffs for supplies other than lighting.

Electronics Course at Harwell

FOR the third time since last summer, the Atomic Energy Research Establishment at Harwell is offering a course to physicists and engineers wishing to obtain specialised knowledge of electronic instruments used in nuclear physics, radiochemistry and work with radio isotopes. Previous courses were staged in July and November last year. The course will last one week starting on May 19, and will deal specifically with the use of electronic equipment for detection and measurement of radiation. Fees for the course will be £12 12s. plus £6 6s. for transport and meals. Applications for admission should be made to Electronics Div., A.E.R.E., Harwell, Didcot.

Iron and Steel Exports

IT was announced by the Board of Trade last week that the price per ton below which exports of general manufactures of iron and steel will be restricted has been increased from £30 to £40 as from last Monday. These arrangements were introduced midway through 1950 to restrict exports of iron and steel goods of a low "conversion value," and the present increase becomes necessary following high prices of those materials. The continuation of restrictions is part of the Government's plans for increasing export of higher conversion value.

B.I.C.C.'s New Company

AN official announcement was made last week-end by British Insulated Callender's Cables Ltd., and Loewy Engineering Co. Ltd., concerning the formation of a new company to be called Alsheath Ltd. The new company's registration was reported in our December 13 issue, but at the time no further information was available. B.I.C.C.'s recent statement says that Alsheath Ltd. has been formed to utilise knowledge, patents and development work in the field of aluminium sheathed cables. The experiences of B.I.C.C. as cable makers and of Loewy Engineering as builders of extrusion presses, are to be utilised in new plant for the cable-making industry in the U.K., and for export.

The Meter Readers' Strike

THE strike of many meter readers employed by the London Electricity Board was this week discussed by Sir Robert Gould, chief industrial Conciliation Officer to the Ministry of Labour, and representatives of the N.J.I.C. Last Thursday's meeting of the National Joint Industrial

The First Half Century

Users of electric launches on the Thames will be glad to hear that the Thames Valley Launch Co. Ltd., is arranging for two more electric charging stations, making in all eight stations belonging to it, where electric launches may be charged in the Thames. It also announces a big reduction in the price of current to its own customers, i.e., those who have launches built by the firm, or who house their boats with it by the year. The price to them will be reduced to eightpence per unit, the usual charge on the river being one and six.—*From our issue of January 23, 1902.*

A view of St. Albans Church, Warrington, where a combined fluorescent and tungsten lighting scheme was installed recently. Note that the fluorescent lighting, augmenting the tungsten fittings, has been well concealed

Council for the Electricity Industry, at which the matter was discussed, ended in deadlock. At that time it was reported that the employers' side of the Council expressed disapproval of the action of Mr. H. J. Randall, chairman of the L.E.B., in issuing a statement in which he referred to the Electrical Trades Union as being communist dominated. He also considered the major aim of the E.T.U. was to be the dominant—if not the only—union for manual workers in the supply industry. The Bethnal Green strike was in furtherance of that aim, and similar trouble is now arising in St. Pancras, he added.

Following the N.J.I.C. meeting, Mr. Frank Foulkes, president of the E.T.U., is reported to have stated that Mr. E. W. Bussey, labour relations member of the B.E.A., said, "The unanimous feeling on the Electricity Board side is that they regret such a statement was issued to the Press, and disassociate themselves from the manner and form of the statement made". But last week-end, Lord Citrine, chairman of the B.E.A., made it clear that (1) the action of Mr. Randall was entirely within his authority as chairman of the L.E.B.; (2) that as such it could not properly come within the purview of the N.J.I.C., and (3) no official statement was issued after the recent meeting of the Council.

After a meeting of the employers' side of the N.J.C., on Monday, a statement was issued, on somewhat similar lines, emphasising that there was no intention on the part of the Board's representatives to imply censure on the action of Mr. Randall.

OFFICIAL PUBLICATIONS THIS WEEK

ECONOMIC CO-OPERATION. H.M.S.O. 6d.
Twelfth report of operation under E.C.A. between Britain and U.S. for April to Sept., 1951.

GOVT. RESEARCH REPORTS. Vol. 3. H.M.S.O. 30s.
D.S.I.R. report on protection and electro-deposition of metals.

B.S. CODE OF PRACTICE (C.P.1004): Part 1. 4s.
Street Lighting—Traffic Routes. (See page 150.)

E.R.A. REPORTS
G/XT 131 *Gas-blast air circuit-breakers: a preliminary study of arc form and movement in a single axial blast experimental model (price 15s. 4d.); G/XT 137 Series breaks in circuit breakers: some factors affecting accuracy in recording the distribution of restriking voltage (price 7s. 9d.); G/T 259 Intrinsic safety of electrical circuits in relation to the explosion hazard in industry and relative ease of ignition by weak sparks of various gases and vapours (price 7s. 9d.); (Obtainable from E.R.A., Thorncroft Manor, Dorking Road, Leatherhead.)* (See page 158)

Church Lighting at Warrington

COMBINED fluorescent and tungsten lighting have been used in a recent installation at St. Albans R.C. Church at Warrington. Both forms of lighting have been employed in the nave but the altar has been illuminated solely by fluorescent lamps. All fittings were supplied by the G.E.C. and the scheme was carried out by W. A. Boulting Ltd.

The six pendant fittings which illuminate the nave are made of copper, finished black and glazed with frosted rimpled glass panels. They are 2 ft in diameter and house five 100 W lamps. Similar, but smaller fittings light both the gallery and the underside of the gallery at the back of the church. To augment the tungsten lamps, 5 ft 80 W fluorescent fittings have been mounted in each window recess. These are equipped with anodised aluminium reflectors and mellow lamps. The altar has been lighted by five 5 ft 80 W fluorescent fittings concealed behind the arch and mounted in silvered mirror reflectors.

Holme Moss boosts T.V. Sales

THE decline in the sales of radios during October continued during November according to the R.T.R.A. index for the latter month just published. Just as radio sales fell, sales of TV sets over those two months increased and the opening of Holme Moss appears to be having its effect. The average number of sets sold per shop was:

Month	1951	1950
RADIO		
October	9·48	15·22
November ...	9·17	15·33
TELEVISION		
October	12·41	10·75
November ...	14·26	9.00

Rise for Maintenance Men

AT last Thursday's meeting of the National Joint Industrial Council for the Electricity Supply Industry, an increase of 2d. an hour was agreed for maintenance craftsmen in the industry, making their rate of pay 3s 8½d. per hour. This increase affects about 20,000 workmen.

More Farmers using Electricity

A SURVEY of equipment and electricity used on farms was carried out a short time ago as part of the N.F.U. farm accounts scheme. The investigation covered 3,380 identical holdings. Among the findings was the fact that some 12·1% more farms were using electricity for power during 1949-50, compared with the year 1948-49. More farms were found to have crop driers and milking machines, some 61·3% and 12·3% respectively, and a similar tendency was found in the supply of mains electricity (7·5%). This latest survey again showed a tendency for those farms already connected to a public supply to use electricity for production as well as farm lighting.

Air Navigation on the Continent

THE German chain of Decca Navigator transmitting stations was officially opened at a ceremony at Dusseldorf airport last Thursday. This is the fourth such chain to be completed and links those already in operation in Britain and Denmark.

Sodium Lights in Lanarkshire

A NUMBER of street lighting schemes have been completed in recent weeks along roads in Lanarkshire, among which is possibly one of the longest unbroken stretches of sodium lighting in Britain. This scheme extends along some 7½ miles of the main road between Glasgow and Carlisle, and consists of equipment supplied by the British Thomson-Houston Co. Ltd. Enclosed type lanterns (S.L. 721) housing 140 W lamps were used mounted at 26 ft. and spaced at 120 ft.

The same company also supplied fittings for mercury vapour schemes between Hamilton and both East Kilbride and Motherwell. The installations were planned by the county lighting engineer.

I.E.S. Summer Meeting in May

PROVISIONAL programme for their summer meeting this year has just been announced by the I.E.S. It is to take place at Eastbourne between May 20 and 23, the first day being devoted to a reception at the Winter Garden only. The official opening will be the following morning. The A.G.M. and President's dinner will be on the Thursday. Two papers are to be presented on each of the three days, those on the first being "Eye, Brightness and Illuminating Engineering" by Dr. W. S. Stiles, and "Two Frontiers of the Lighting Art" by H. L. Logan. Thursday's papers will be "Problems of Underwater Illumination" by W. D. Chesterman and J. B. Collins, and L. C. Kalff's "Interior Lighting Developments in the Netherlands." "Lighting in Schools," by A. Pott, and "Design of Interior Lighting Equipment" by L. H. Hubble, complete the serious part of the programme.

Registration fees for the meeting will be £1 for members and 10s. for ladies, with 10s. and 5s. rates per day for those unable to attend the whole period. Application for tickets must be made to the Secretary, I.E.S., by February 15.

Looking along the A776 road between Hamilton and E. Kilbride, now lit by 250 W mercury vapour lamps—one of four schemes carried out in Lanarkshire with fittings supplied by B.T.H.

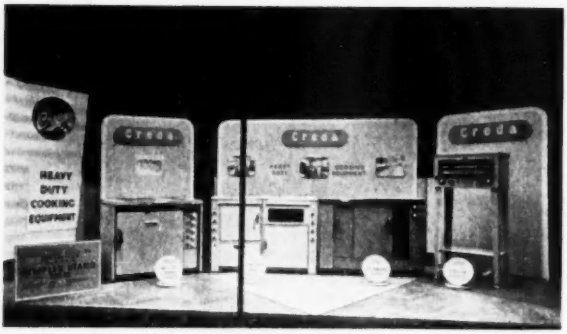
Electric Goods Trains at Wath

IT is understood that the first full working of a section of the electric railway track from Wath-on-Dearne to Manchester will begin on February 3. An experimental system for freight and coal trains is to be introduced on the Wath-Dunford part of the line. Trains from the north and east will be uncoupled from steam engines at Wath and switched to electric locomotives, the reverse process operating at Dunford. Two electric engines will be used for each train, one pulling and the other pushing. The amount of time saved by this switch is estimated as 25 minutes. During the experimental period between 25 and 30 trains will run on the section each day.

Turkey's Trade Fair

AN estimated average of 28 persons a minute are said to have passed through the British Pavilion at the Izmir (Turkey) International Trade Fair which took place between August 20 and September 20 last. Although this exhibition (the 20th, incidentally) may be termed as one of the lesser-known of the trade shows taking place throughout the world each year, some idea of its size may be gained from the official attendance figures of over 1½ million. The British Pavilion was organised by the British Chamber of Commerce of Turkey (Inc), and occupied some 21,000 sq. ft., housing about 200 British displays and a wide range of products. The film show each evening attracted an average audience of 500 at every performance.

The same dates have been fixed for the 21st Fair this year, and although the British Pavilion is to occupy greater space, bookings are expected to be made quickly in view of the 1951 success.



This display of Creda heavy duty cooking equipment is to be seen at Simplex Electric Co., Ltd.'s Tottenham Court Rd. (London) showroom. It was designed to tie-up and give advance information of activities at the Hotel, Restaurant and Catering Exhibition

Wage Increases in the Industry

AN increase of 2d. per hour to journeymen electricians (and corresponding increases to other classes) with effect from February 4 was agreed at the meeting of the N.J.I.C. last week. As from that date the rate for electricians will be 3s. 10d. per hour in Grade "A" areas, 3s. 6d. per hour in the Mersey district and 3s. 5d. in Grade "B" areas. For adult mates the hourly rates are: Bristol, 2s. 10½d.; London 3s. 2½d.; Mersey 2s. 9½d.; and all other areas 2s. 9d. For male labour under 21 years of age the new rates are:—

Age	Grade "A"	Grade "B"	Mersey
	s. d.	s. d.	s. d.
16	10	9	9¼
17	1 0¼	11	11¼
18	1 5	1 3½	1 4
19	1 10¾	1 8½	1 8¾
20	2 4¼	2 1¼	2 1¾

In the national apprenticeship scheme applying to category I and II boys, the new rates for boys aged 15 is 7½d. in Grade "A", 6¾d. in Grade "B" and 7d. in Mersey, rising at the age of 20 to 2s. 4¼d., 2s. 1¼d. and 2s. 1¾d. respectively. For category III labour, at 16 years of age the rates are 1s. 0¼d., 11d. and 11¼d. in Grade "A", Grade "B" and Mersey respectively, rising at 20 years of age to 2s. 8d., 2s. 4½d. and 2s. 5d. Boys aged 15 not to be apprenticed will get 10½d., 9½d. and 9½d. in the respective areas.

It has also been announced that the Joint Industrial Council for the Electrical Cable Making Industry has accepted the recommendation of the Committee on Plumber Jointers that the Out Allowance be increased to 7s. a day, with effect from the third pay day in February.

More Help for Dollar Exporters

POTENTIAL dollar exporters can glean a great deal of help from various organisations willing and able to assist their ventures into the U.S. and Canadian markets. The Dollar Drive Branch of the Export Credit Guarantee Dept., whose aim is to reduce the financial risks involved in breaking into dollar markets or expanding business there has just published a valuable little booklet describing the facilities offered. Market surveys, advertising and sales promotions compaigns and stockholding are all necessary if not essential, and the booklet details the department's facilities which are designed to help exporters make full use of these techniques.

The Matter of Rural Supplies

DISSATISFACTION on the subject of rural electrification appears to be nation-wide. Following our reports of complaints as to the slow rate of progress by the Eastern and S. Wales Consultative Councils in recent weeks we have received accounts of similar concern from Aberfeldy, Golspie and Southwold. In the first two cases views were expressed at local meetings of the N.F.U. At Aberfeldy objections were raised to "ridiculous" charges being imposed for supply of electricity to farms. The union, it was said, was campaigning for the introduction of a flat rate charge regardless of where a farm was situated. Slow progress was the complaint at Golspie where it was agreed to ask the county area of the union to follow up the circumstances of the Board's refusal to supply a particular farm because of the scarcity of raw materials and the isolated position. In this case a technical school and instructional farm 500 yards distant had received a supply already.

At Southwold Col. J. Harwood Harrison, M.P., spoke of the muddle in the extension of electricity in rural areas. He alleged that in the first two years of nationalisation agreements for supplies were drawn up and signed. In 1951, development ceased. Now he said hundreds of farms and dwellings were wired, money spent, but there was no hope of connection.

N.W. Displays Competition

RESULTS of the N.W. Electricity Board's fourth annual window display competition have just been announced and the chairman's challenge cup has been awarded to the Workington Service Centre. Centres throughout the area competed and achieved a high standard of workmanship. The competition had a Christmas theme, each window reflecting service to the consumer and economy in the use of electricity. The winning display was based on the ideas of children's make-believe—fairy-tale and nursery-rhyme characters being set against a pale blue background. The final selection followed sub-area competitions in which the winners, besides Workington, were Eccles, Ormskirk, Uppermill, Lancaster, Bacup and Disley.

Houses delayed by Faulty Wiring

NOT long ago we reported in these columns the dispute in Manchester concerning the wiring of prefabricated houses, which since the inception of

those bungalows has been the subject of controversy. The question of faulty wiring (though by no means proven in the case of prefabs) was brought up at Walsall town council meeting last week in respect of ordinary houses, when it was said that plaster had to be ripped off the walls to repair earth wires, holding up building progress on an estate there. A member of the council said earth wires were too thin and had been replaced by removing plaster between the light socket and wall switch. An inquiry was urged to see why the houses (some 60 to 70 were involved) had to be maltreated because of what was alleged by one member of the Council to be faulty wiring. The sub-contractor has, we understand, repaired the fault and the council has incurred no additional cost.

New Lights in Blackwall Tunnel

THE first part of the redesigned lighting scheme in the Blackwall Tunnel (the Poplar entrance) is now in operation. It was decided to undertake the complete relighting of the tunnel in 1949, following extensive enquiries and the proved inadequacy of the previous installation, designed for motor traffic of the early 1930's. Features of the new scheme are that fittings have been placed on either side in preference to the centre of the tunnel, and the gradual tapering off in intensity of illumination. Special fittings have been designed by the L.C.C. chief engineer's department, and 120 of these have now been installed, each housing an 80 W fluorescent lamp with louvres and control gear. Normal spacing between fittings is 30 ft, but at the entrance they are considerably closer to give the necessary increased illumination. Each lamp has also been connected to the mains by a "fused" plug, which may well be the first time this system has been used in an installation of its size.

Conferences Cancelled

E.D.A. Council has decided to cancel their Sales Management Conference which was to have taken place next May. The Demonstrators' and Housecraft Advisers' Conference, organised by the E.D.A. and the E.A.W., and due to be held this month, has also been cancelled. These steps have been taken, we understand, as a contribution to the national economy.

Hundred N.C.B. Scholarships

FOR the fifth year, the National Coal Board is offering 100 University scholarships in mining, engineering and allied subjects. They cover the whole cost of education and in addition there are maintenance allowances which may amount to more than £300 a year. Scholarships are tenable at any University offering suitable degrees or diplomas. After graduation, students normally do three years practical training. Applications should be made by March 15 on special forms to N.C.B.'s Education Branch, Hobart House, Grosvenor Place, S.W.1.

Sindri Fertiliser Factory

MESSRS. Reyrolle & Co., Ltd., wish us to point out that they have supplied a large amount of switchgear to the Sindri fertiliser factory in India. This includes 93 400-volt panels and 50 3·3 kV panels. We regret any impression which may have been gained by our readers that the switchgear was all supplied by one firm.

Acton Lane

IN our article on "Progress at Acton Lane," it should be pointed out that Brian Colquhoun and Partners are the consultants employed by Sir Robert McAlpine and Sons, solely for the design of the pre-cast turbine-house and transformer and switchgear annex, and not by the B.E.A. as main consultants for the complete station.

NEWS IN BRIEF

The fifth annual dinner of the ex-Johnson and Phillips Association will be at Grosvenor House, W.1, on March 1. It will be preceded by the annual meeting. Tickets are obtainable from Mr. W. F. Smith, 66 Coleraine Rd., Blackheath, S.E.3.

The B.E.A.'s dramatic club—Portland Players—gave admirable performances of "On Monday Next" at the Portland Hall on Thursday and Friday of last week. Anthony Moss' performance as George, after only three rehearsals, was particularly noteworthy.

The British Industrial Measuring and Control Apparatus Manufacturers' Association held their eighth annual luncheon in London last week.

The Building Centre's new headquarters was officially opened by the Rt. Hon. David Eccles, M.P., Minister of Works, last Monday. Details of the new H.Q. were given in our January 10 issue.

Photograph taken at the annual staff dance of Scottish Cables Ltd., held at the Marlborough, Glasgow, recently. Mr. William Fraser, governing chairman (centre) is seen with directors and executives and their ladies

Electric Supply News

Castle Donington

Preliminary work has begun on the construction of the new Castle Donington power station. So far, orders have been placed for three 100 MW Metropolitan-Vickers turbo-alternators, but not for the boilers. The station is designed to house six 100 MW sets ultimately.

Great Yarmouth

The local M.P., Mr. A. Fell, has been told that work on construction of the new power station at the south end of Great Yarmouth sea front is unlikely to start before the beginning of 1953.

Midlands

The Midlands Electricity Board proposes to carry out a scheme for standardisation of voltages in its area this year, it is announced.

North Eastern Board

The report of the North Eastern Electricity Board, submitted to the quarterly meeting of the Regional Consultative Council, stated that load shedding in the area had so far resulted in a transfer of 60/70 MW of load from the peak morning period to other times of the day. This represented about 20% of the "spreadable" load. The report stated that a survey had been carried out in connection with the introduction of the Board's new standard tariffs, to ascertain the number of rooms in houses and the floor areas of shops, hotels, etc. The report admitted that the basis of room assessment for domestic tariffs had not been without criticism especially where in the past the assessment had been based on rateable value. The report added that in the Hetton area, it was proposed to install electric boilers and cookers in 1,100 houses. Consent had so far been obtained for the change over of about 200 houses which could be supplied from the Board's present distribution system. During the three months of September, October and November, 110 substations had been brought into commission and in addition 106 farms had been connected compared with 109 in the corresponding period of 1950. Thirteen villages had also been connected.

North Wales

Another attack on the North Wales Hydro Electric Power Bill being promoted by the B.E.A. was made last week-end by the North-West Wales River Board. This Board agrees that in the area there is an abundance of water, and all interests are satisfied that there is at the moment a surplus. This surplus is available for employment in the best interests of the area and of the nation, and the Board have no objection to it being used to provide electricity. But under the Bill, the B.E.A. seeks to take more than the surplus available, it is alleged. It seeks to appropriate for production of electricity (little if any of which will be available for local rural electrification) approximately 90% of waters in the rivers and lakes to be affected, the report goes on. After alleging that the character and flow of the rivers, and their possible future use, have apparently received no consideration, the economics of hydro-electricity production being held of paramount importance, the Board feels that as a direct result of the Bill (if approved), land drainage and river maintenance problems will arise which would otherwise be non-existent. The Board considers that these will involve expenditure which would fall as an ultimate charge on ratepayers in the area.

Orkney

The severe hurricane which struck Orkney last week did considerable damage to the lines of the North of Scotland Hydro-Electric Board in the area, and about 50 men were engaged on the repair of distribution lines. It took almost two hours for a squad of four men to clear the tangled masses of straw and hay from the o.h. lines on one farm alone. Instruments at Kirkwall recorded their maximum wind velocity measurement of 105 m.p.h. The N. of Scotland Board's experimental wind-driven generating station, nearly completed at Costa Head, came through the hurricane with comparatively little damage, fortunately, apart from the loss of some instruments and a few hut roofs. At this wind-power station, the equipment for which is being supplied by John Brown and Co., Ltd., most of the plant is in place, and some trial runs have taken place, we understand, but certain other tests and modifications are necessary before the station will be placed in full scale operation.

LIGHTING SCHEMES

Blackpool.—Because the time is not considered opportune, the Highway Committee has rejected a proposal for improved lighting on the Promenade between Manchester Square and near Hotel Metropole.

Bradford.—T.C. has approved a scheme for improved street lighting at Halifax Road, at a cost of £2,514, and for street lighting on new estates at Thorpe Edge (£8,922), Shirley Manor (£2,046) and Elmfield (£1,675).

East Kilbride.—Additional street lighting at Kirktonholm will cost £2,000.

Gt. Yarmouth.—T.C. is recommended to approve a scheme for improved street lighting in the area of Swanstons Road, Marine Parade, South Denes Road, at a cost of £5,795.

Largs.—The T.C. is to relight the main road through the burgh with fluorescent and sodium lighting, at a cost of £5,945.

Luton.—The Highways and Planning Committee has approved modified proposals for the conversion to sodium lighting of the existing lighting in Cromwell Road, Biscot Road, Mayne Avenue, Leagrave High Street and Grange Avenue, at a cost of £4,810.

Company Activities

Associated Electrical Industries Ltd.

It is proposed to increase the capital of the company to £18,000,000 by the creation of 5 million additional Ordinary shares of £1 each and 3 million unclassified shares of £1 each. It is proposed that such new shares be at the disposal of the directors, who may allot, grant options over, or otherwise deal with or dispose of them at such times and ranking for dividends as they consider proper. If this increase in capital is authorised at a special meeting on January 31, a total of 2,217,649 of the new Ordinary shares will be offered at 60s. each to holders of existing Ordinary stock in the proportion of one new for every £3 of Ordinary stock held. These shares will not rank for any dividend in respect of the year ended December 31, 1951, but will rank *pari passu* with the existing Ordinary stock in all other respects when fully paid up. The proceeds of this issue will provide £6,652,947 to finance the company's business. Sir George Bailey, chairman, states that earnings for the first ten months of 1951 are slightly higher than for the corresponding period of 1950. It is anticipated that the present rate of dividend should be maintained for 1952 on the increased issued capital.

British Insulated Callender's Cables

Subject to the consent of the Capital Issues Committee, it is the intention of the directors to issue further Ordinary capital "at a suitable time and price," and to offer the shares as rights to Ordinary stockholders. It is intended to increase the capital to £17,500,000 by the creation of 5 million additional Ordinary shares of £1 each. An extraordinary meeting to consider the proposal is called for January 29.

Burgess Products

For the year to July 31 last, the combined profits, before taxation, amounted to £139,630, thus exceeding the directors' forecast of a profit of at least £121,726 made when the company's shares were marketed in July last. Taxation absorbs £81,550. An Ordinary dividend at the rate forecast —22½%—is recommended.

Ley's Foundries & Engineering Co.

Group trading profits for the year ended September 30 last was £800,084, as against £641,653 for the preceding year. After charging taxation, etc., the net profit was £298,271 (*£212,789*). To Preference dividend £12,094 (*£12,375*), and after providing £32,175 for the unchanged Ordinary dividend of 11% the sum of £100,000 (*nil*) is transferred to general reserve, and £765,068 (*£611,066*) is carried forward. Extensions to the foundries completed in 1949-50 were fully employed last year, and the directors report that the heavy demand has continued so far during the current period.

R. A. Lister & Co.

The preliminary statement shows a group profit of £627,972 (*£565,766*) for the year to September 30 last. There is a final dividend of 6½%, making 9% (*same*). Taxation absorbs £374,993 (*£268,545*), and to tax equalisation reserve, £16,790 (*£52,040*). The sum of £2,443 (*£934*) is due to outside interests, leaving the net profit of the parent company at £177,298 (*£197,638*).

Marco Refrigerators Ltd.

The directors announce that no final dividend will be paid for the year to September 30 last. An interim of 7½% has already been paid. In the previous year a final of 10% was paid on top of an interim of 7½%. For the year to September 30 last, the net profit is £29,035 (*as against £32,884 for the previous year*) before charging taxation of £17,634 (*£18,121*). The sum of £61,029 (*£56,718*) is carried forward.

L. Sterne & Co.

The preliminary statement of this concern, which makes refrigerators, etc., for the year ended October 31 last shows a net profit of £91,220 compared with £77,174 for the previous twelve months. This figure is struck after allowing taxation of £105,000 (*£83,000*) and depreciation of £85,014 (*£70,745*). The dividend is again 15%. To initial allowances taxation reserve £10,000 (*£15,000*), to general reserve £50,000 (*£40,000*), leaving £69,599 (*£56,334*) carried forward. The directors also announce that application has been made to the C.I.C. for permission to issue the balance of the Ordinary capital, consisting of 144,000 £1 shares, in the proportion of 12 shares for every 13 held.

Telephone and General Trust

It is proposed that the capital be raised to £1,650,000 by the creation of 350,000 additional £1 Ordinary shares, which are to be offered by way of right to present holders "as soon as convenient." The present issue amounts to 550,000 7% Cumulative Preference, 627,000 Ordinary, and 100,000 "A" Ordinary £1 shares.

Yorkshire Copper Works Ltd.

In explaining how profits ascertained in the orthodox manner are illusory, Col. G. P. Norton, chairman, at this meeting last week, said that a very considerable proportion of those so-called "profits" were required for replacing at greatly increased cost, the raw material of the stocks sold. The same applied to book debts. In addition, the replacement of worn out machinery costs often two, three and more times the original cost of the machinery replaced. They had, to a considerable extent, provided for that by revaluing the plant and setting aside depreciation calculated on the revalued figure, but he reminded shareholders that the Inland Revenue would only allow for tax purposes a charge for wear and tear based on the original cost.

Commercial Information

CONTRACTS OPEN

HOME

Jan. 28.—Nuneaton T.C. Installation of street lighting on Camphill housing estate. Borough Surveyor, Council House. Deposit £2 2s. (See Jan. 10 issue.)

Jan. 28.—West Penwith R.D.C. Electrical installation in 10 houses at St. Buryan and four at Wall. Architect-Surveyor, F. Hartley, 38 Chapel St., Penzance.

Jan. 29.—Rochdale T.C. Installation of electrical motive power to machinery and plant at Technical College. Borough Surveyor, Town Hall.

Jan. 30.—Southwark B.C. List of supplies required includes electric lamps. Town Hall, Walworth Rd., S.E.17.

Jan. 30.—Swinton and Pendlebury T.C. Supply of 250 electrically operated controllers for street lighting, each must have spring reserve for use during cuts, and solar dial, also dust-proof case and suitable for 240 V 50 c/s supply. V. Collinge, Town Clerk, Town Hall, Swinton.

Jan. 31.—Forden (Mon) R.D.C. Electrical wiring of 1 to 6 Springfields. F. Hunt, Surveyor, Llwyn, Montgomery.

Jan. 31.—Wembley T.C. Electric lamps in list of supplies wanted for year beginning April 1. Maintenance and Transport Engineer.

Feb. 1.—Tottenham. Supply of electric lamps required. M. Lindsay Taylor, Town Clerk, Town Hall, Tottenham, N.15.

Feb. 1.—Belfast. Supply and erection of three-phase 33 kV oil-immersed reactor of non-ferrous shielded type. Tenders also invited by Feb. 15 for supply and erection of chlorinating plant with pumps and all associated equipment. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit in each case, £5 5s. (See Jan. 10 issue.)

Feb. 1.—Belfast. Tenders are being invited by Electricity Dept. for annual supply of stores, including transformer oil, transformer kiosks, insulated cables, lamps, washboilers, kettles, etc. Dept. is at East Bridge St., Belfast. Deposit 10s. (See Jan. 10 issue.)

Feb. 1.—Southgate B.C. Supply of 135 lanterns and control gear for 250 W mercury vapour lamps, and supply and erection of 135 concrete standards and fixing of lanterns, control gear, wiring, etc., for Group A lighting. Applications by above date to Borough Engineer and Surveyor, Southgate Town Hall, Palmers Green, N.13. (Advertised in this issue.)

Feb. 1.—Stafford T.C. Provision and erection of a number of automatic-controlled electrically driven centrifugal pumping units. T. H. Higson, Borough Engineer and Surveyor, Mount St. Deposit £3 3s.

Feb. 2.—Peterborough. Lighting and power installations to 50 houses on Mountsteven Ave. estate. Applications by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Feb. 2.—Prestwich T.C. Lamps and electrical equipment included in supplies wanted for 12 months ending Mar. 31, 1953. Borough Engineer, Town Hall.

Feb. 2.—Scunthorpe T.C. Electric lamps included in supplies wanted for year ending Mar. 31 1953. Cyril Cooper, Borough Surveyor, Comforts Ave.

Feb. 4.—Hendon T.C. Supply and installation of open-type lanterns for 140 W sodium lamps with transformers, condensers and ancillary equipment for lighting of North Circular Road between Brent Cross and Edgware Rd. Also supply of reinforced concrete columns for same scheme. These are separate contracts. A. O. Knight, Borough Engineer and Surveyor, Town Hall, N.W.4. Deposit £2 2s. in each case. (See Jan. 17 issue.)

Feb. 4.—Stoke-on-Trent. Electric lamps included in list of supplies for six months ending Sept. 30 next. City Surveyor, Town Hall.

Feb. 5.—Gillingham (Kent) T.C. Supplies for year beginning April 1 include switches and accessories, conduits and accessories, wire and cables, cooker, wash-boiler and fire spares, lamps, etc. Borough Engineer and Surveyor, Municipal Buildings, Gillingham.

Feb. 5.—Scottish Gas Board. Supply of electric lamps wanted for year beginning April 1. Divisional Controller of Board, Glasgow Division, 30 John St., Glasgow.

Feb. 6.—Derby T.C. Electrical installation to 80 houses on Mackworth estate. Borough Architect, The Council House, Corporation St. Deposit £2 2s.

Feb. 6.—Manchester. Supply of (a) bowl reflector lanterns for 80/125 W H.P.M.V. lamps, and (b) sets of auxiliary equipment for 125 W H.P.M.V. lamps; for year ending Dec. 31, 1952. City Surveyor, Town Hall, Manchester 2. (See Jan. 17 issue.)

Feb. 6.—Manchester. Supply of Group B concrete street lighting columns during year ending Dec. 31, 1952. City Surveyor, Town Hall. (Advertised in this issue.)

Feb. 6.—Northumberland. Lighting installation at Hexham grammar school. Names to County Architect, County Hall, Newcastle, by above date. Deposit £2 2s.

Feb. 6.—Gt. Yarmouth T.C. Supply of cables wanted for one year from April 1. Borough Engineer, Town Hall. (Advertised in this issue.)

Feb. 7.—Mitcham (Surrey) U.D.C. List of supplies wanted for 12 months from April 1 includes electric lamps. Borough Engineer and Surveyor, Town Hall.

Feb. 8.—Manchester. Electrical installation at Hawthornden, Palatine Rd. City Architect, Town Hall. Deposit £1 1s.

Feb. 9.—Halifax T.C. Re-electrification of Haugh Shaw primary school. Borough Engineer, Crossley Street. Deposit £2 2s.

Feb. 9.—Bedworth U.D.C. Provision and erection of 103 reinforced concrete lamp columns with 80 W mercury lamps and all equipment. Engineer and Surveyor to Council, 134 Nesston Rd. Deposit £3 3s. (Advertised in this issue.)

Feb. 9.—Ruislip-Northwood U.D.C. In list of supplies

required for year beginning April 1 electric lamps are included. Engineer and Surveyor to Council, Council Offices, Northwood, Middx.

Feb. 9.—Swansea T.C. Lamps for public lighting and lamp pillars included in list of supplies wanted by year beginning April 1. Borough Engineer and Surveyor, Guildhall.

Feb. 11.—Bath. Electrical installation in Julian Rd. flats. Architects are Hugh Roberts and Davies, 7 Brock St. Deposit £1 1s.

Feb. 11.—Buxton T.C. Supply and installation of (a) 12 lanterns, MAF/V 400 W lamps, control gear and concrete columns for Group A lighting along London Rd.; and (b) 24 lanterns, MBF/V 80 W lamps swan-neck pillar mounting conversion brackets with control gear for Group B lighting along three roads. Borough Engineer, Town Hall. Deposit £2 2s. (Advertised in this issue.)

Feb. 11.—Stalybridge, Hyde, Mossley & Dukinfield T. & E.B. Installation of electric light and power for new bus garage. Architects, Howard and Benson, 88 Mosley St., Manchester 2. Deposit £2 2s.

Feb. 14.—Merthyr Tydfil T.C. Electrical installations at Pentrebach infants', Edwardsville junior mixed, Woodlands, Brecon Rd. infants' and Merthyr R.C. schools. Also the same at Caedraw junior mixed, Queens Rd., Pant and Dowlais infants' schools. These are separate contracts and deposit in each case is £2 2s. Borough Engineer's Dept., Town Hall. (See Jan. 17 issue.)

Feb. 15.—Belfast. Supply and erection of bulldozer with capacity of 120 tons coal per hour, minimum h.p. of 100 for engine, for Victoria power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Jan. 17 issue.)

Feb. 15.—Sheffield. Electrical installation in secondary school for girls at Hurlfield. W. Geo. Davies, City Architect, Town Hall. Deposit £2.

Feb. 16.—Harpenden U.D.C. Erection of 40 reinforced concrete columns with lanterns in Class B. Engineer and Surveyor, Harpenden Hall. Deposit £1 1s.

Feb. 16.—Solihull U.D.C. List of supplies required for year beginning April 1 includes electrical fittings and lamps, concrete lamp columns, street lighting fittings. Engineer and Surveyor, 90 Station Rd.

Feb. 18.—Denbighshire. Electrical installation in proposed new grammar school at Ruabon. Names to G. D. Wiles, County Architect, Grove Park, Wrexham, by Jan. 29. Deposit £3 3s. (See Jan. 17 issue.)

Feb. 20.—Hertfordshire. Electric lamps included in list of supplies for year beginning April 1. Central Purchasing Officer, The Old Rectory, Hatfield.

Feb. 25.—Hastings T.C. Rewiring of electrical installation at Clive Vale secondary school. Borough Engineer, 37 Wellington Sq. Deposit £2 2s.

Feb. 25.—Herne Bay U.D.C. Supply and installation of two electrically-driven sewage pumping units each of 500 g.p.m. capacity, with switchgear, etc. W. W. Smith, Engineer and Surveyor, Council Offices. Deposit £2 2s.

Feb. 27.—Birkenhead. Lamps and cables included in list of supplies required for year beginning April 1. Transport Manager, Transport Offices, Laird Street.

Feb. 27.—Stoke-on-Trent. Rewiring of lighting and power installations at "Westcliffe," Turnhurst Rd., Tunstall, Stoke-on-Trent. Applications to Harry Taylor, Town Clerk, Welfare Services Dept., Kingsway, Stoke, by Jan. 26. Deposit £2. (See Jan. 3 issue.)

Feb. 27.—Tynemouth T.C. Supply and erection of four electrically operated pumping units, each of 1,300 g.p.m., at Mitford. Water Engineer and Manager, 8 Northumberland Sq., North Shields. Deposit £3 3s.

Feb. 28.—Dewsbury T.C. Supply of electric lamps, cable, lanterns, lighting columns. C. H. Midson, Street Lighting Engineer, 27 Baltye St. (Advertised in this issue.)

Mar. 1.—Bridgwater T.C. Supply and installation of two electrically driven pumps. Borough Engineer, Town Hall. Deposit £2 2s.

Mar. 1.—Dundalk U.D.C. Supply and installation of certain sewage pumping machinery, electric motors, switches, accessories, meter and ancillary equpiment. J. A. Smyth, Town Clerk, Town Hall. Deposit £5 5s.

Mar. 11.—East Riding. Installation of electrical services at Withernsea secondary school. Applications to County Architect, County Hall, Beverley. (Advertised in this issue.)

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Feb. 13.—Uruguay. Usinas Electricas y Telefonos del Estado requires six diesel generating sets (preferably mobile)

Your Queries — Answered

"McGraw Toastmaster" agents for? B.B.—Frank V. Magrini Ltd., 24 Royal College St., N.W.1. (22493)

"Maxlume" fires, makers of? T.E.—Veritys Ltd., Plume Works, Aston, Birmingham. (22498)

"Magnum Super" frequency units, makers of? H.R.—Electric Supplies and Repairs Ltd., 28 New Cannon St., Manchester 1. (22468)

"T.S.P." irons, makers of? E.M.—Tool and Steel Products Ltd., Abbeydale Works, Woodseats Rd., Sheffield. (22475)

"Halls of Rotherham", address of? M.E.—This firm is now British Automatic Refrigerators Ltd., Masbro St. Works, Rotherham. (22481)

"Armacell" insulating varnish, makers of? W.E.—Griffiths Bros. and Co. (London) Ltd., 29 Macks Rd., S.E.16. (22488)

"Duro" pumps, makers of? L.E.—These were made by the Duro Co., 537, E. Monument Ave., Dayton, Ohio, but we cannot trace any agents for this firm at the present time. (22507)

The above are selected from questions we have answered this week. If you have a query, send it to us.

—three to have power of between 100 kW and 120 kW and three between 180 kW and 200 kW—suitable for 3-phase 230 V a.c. 50 c/s. B.o.T. (Ref. CRE (IB) 78910/51)*.

Feb. 15.—Uruguay. Administracio General, Usinas Electricas y Telefonos del Estada invites tenders for supply of power transformers and spare parts. B.o.T. (Ref. CRE 22/52).*

Feb. 18.—Uruguay. Supply of 24 sets of equipment for transformer substations, interior type, for use in distribution grid of Montevideo Usina Electrica. Each set comprises, 2 h.t. cable cells, and 2 transformer cells (7,000 V) 1 transformer cell for h.t. voltmeter and 1 switchboard panel B.o.T. (Ref.: CRE 27/52)*.

Feb. 21.—Australia. Sydney C.C. invites tenders for manufacturing supply and erection of automatic signal equipment for 96 substations, with accessories and all necessary equipment for operation. C.C. is at Queen Victoria Building, George St. B.o.T. (Ref. CRE 33/52)*.

Feb. 27.—New Zealand. Supply of 400 miles of tinned copper wire, 1/·044 in. vulcanised rubber insulated, taped, braided and compounded, twin core (twisted) for N.Z. Post Office, Stores Division. Contract No. Pad T 150/5131.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, ,, ,, "English" quality ...	176 10 0	
Tin (99-99·75%) ... ...(Cash)	974-975	—
,, (3 months)	973-975	—
ALUMINIUM, commercial purity (del.)	148 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Bingley Refrigeration Services Ltd. Resolution for voluntary winding-up passed at meeting on Jan. 11. Clifford A. Harrison, 23 Cheapside, Bradford, was appointed liquidator.

Crystal Manufacturing Co., Ltd. Resolution passed for voluntary winding-up at meeting on Jan. 7, when T. J. M. Macleod of 4 Bucklersbury, E.C.2, was appointed liquidator.

Supreme Refrigeration Co., Ltd. Meetings of members and creditors to be held at Harry L. Price and Co., Ltd., 47 Mosley St., Manchester, on Jan. 28 at 2 and 2.15 p.m. resp.

Llansilin Electricity Co., Ltd. Meeting of members will take place at the Cross, Oswestry, on March 5 at 3 p.m., to receive liquidator's report.

Wembley Electrical Appliances Ltd. Winding-up order is dated Jan. 14. Date of presentation was Nov. 22.

BANKRUPTCY ACTS

Receiving Orders

Lincoln. J. L. Parker, electrician, of 15 West St., Horncastle. Date of receiving order is Jan. 10.

Birmingham. Jack Jackson, trading as Jacksons Electrical Supplies at 103 Station Rd., Sutton Coldfield. Date of order, Jan. 15.

Walsall. Cyril G. Clews, trading as Clews Electrical Co. at 226 Stafford St., Walsall. Date of order, Jan. 11.

Appointment of Trustee

Liverpool. William R. Eagle, electrical contractor, trading at 10 Houghton Chambers, 1 Houghton Pl., Liverpool. Trustee is Eric Stevenson Browne, C.A., Central Bldgs., 41 North John St., Liverpool 2.

Intended Dividends

Burton-on-Trent. Norman Henry Green, electrician, of 66 London Rd., Coalville. Last day for receiving proofs, Jan. 30. Trustee is Ernest C. Stimpson, Official Receiver, 22 Regent St., Park Row, Nottingham.

Warwick. Dennis N. Bateman, trading as Villiers Electric at 1 N. Villiers St., Leamington Spa. Last day for receiving proofs, Feb. 5. Trustee is R. K. Clark, Official Receiver, Somerset House, Temple St., Birmingham 2.

Dividends

Liverpool. Frank Taylor, electrical and general contractor, trading at 4 Mercer Court, and 46 Fenwick St., Liverpool. First and final dividends of 3s. 9d. in £ payable at 5 Rumford Pl., Liverpool 3, on Feb. 11.

CONTRACTS PLACED

Aberdeen. Electrification of Premnay school, D. L. Gibbons.

Dudley T.C. Installation of electricity in 224 houses, T. H. Priest and Sons, £5,064.

Gateshead T.C. Electrical work at Southend Rd. school, A. F. Jamison, £5,340.

Hull. Supply of 6½ miles of cable, British Insulated Calender's Cables Ltd., £6,310.

Inverness. Installation of electricity to houses at Mallaig, Western Battery Service, £2,011.

Southport T.C. Electrical installation in 50 houses on Heathfield Rd. site, Graham and Caddick Ltd., £1,168.

Middlesbrough T.C. Electric lighting and power at Marton Rd. school, Haigh and Ringrose Ltd., £1,138.

Newburn-on-Tyne U.D.C. Electrical work in 33 houses at Walbottle and shops and flats at Lemington, Bernard Berrie.

Nuneaton. Electrical installation at Caldwell school, F. Burton, £1,896.

TRADE NOTES

New Factory? British Electric Meters Ltd., one of the Denis Ferranti group of firms, is seeking the tenancy of a Government factory at Penygroes, it is reported.

Change of Address. The Manchester area sales office of the Northern Aluminium Co., Ltd., is now at 75 Piccadilly, Manchester 1. Tel.: Central 5479.

New Factory. The foundation stone of a large defence factory to be built in Hemel Hempstead new town and occupied by Rotax Ltd., was laid last week by Mr. Harold McMillan, Minister of Housing and Local Government.

We learn that Westool Ltd. have taken over another factory on the St. Helen's trading estate, Bishop Auckland, Co. Durham.

BUSINESS PROSPECTS

HOME

Airdrie. Two proposals submitted, for improvements and re-erection of police headquarters and Court Hall, to Scottish Home Dept.

Ballymoney. N. Ireland Hospitals Authority proposes to carry out renovations and extensions at Route Hospital costing £110,000.

Bilston T.C. Erection of a total of 138 houses on three sites. Borough Architect, 20 Wellington Rd.

Birmingham. Erection of 72 dwellings at Kings Heath. H. J. Manzoni, City Engineer and Surveyor, Civic Centre.

Blackburn T.C. Erection of secondary school at Witton Park and extensions to Longshaw primary school. Borough Engineer, Town Hall.

Bolton T.C. Erection of 42 houses on Johnson Fold estate. Housing Director, Town Hall.

Bradford. Erection of infant schools in Reevy Hill and Canterbury Ave. City Architect, Town Hall.

Bradford. E.C. recommends that electrical work be carried out at Sandy Lane school (£590); and Lapage school (£1,360).

Camberwell. B.C. has been allocated 250 houses for erection this year.

Camelford (Corn.) R.D.C. Construction of 22 houses on various sites. Architects are Andrew and Randell, Hepworth Chambers, St. Austell.

Canterbury. Council are expected to invite tenders shortly for erection of 62 houses on London Rd. site.

Chelmsford. Essex C.C. to adapt Highfield, London Rd., into a welfare hostel at estimated cost of £13,547.

Chesterfield T.C. Scheme being considered for electrification of Hodthorpe pumping station at estimated cost of £4,840.

Chesterton (Camb.) R.D.C. Erection of 63 dwellings on four sites. H. Jackson, architects, 92 Hartington Grove, Cambridge.

Crediton U.D.C. Construction of 24 houses at Spruce Park. Council's architects are F. W. Beech and E. Curnow Cooke, 15 Dix's Field, Exeter.

Deal T.C. Plans approved for 32 houses on N. Deal site. Tenders to be invited for erection of 36 flats in two blocks on Orchard Ave. estate. A. W. West, quantity surveyors, 42 Queen St.

Derwent R.D.C. Erection of 50 houses at Barlby. Council's Architect, E. Vyvyan Hunter, 9 Minster Yard, York.

Eastbourne T.C. Tenders expected to be invited shortly for erection of 78 houses at Langley Village.

Eston U.D.C. Erection of 130 houses on Redcar Rd. East estate. N. C. Harrison, Engineer and Surveyor, Normanby Rd., South Bank, Middlesbrough.

Farnham (Surrey) U.D.C. Negotiations in hand for erection of 44 houses on Heath End estate.

Flintshire. Erection of secondary school at Saltney. W. Griffiths, County Architect, Llwynegrin, Mold.

Harlow (Essex). Sketch plans approved for secondary modern technical school estimated to cost £321,975.

Hull. Ministry consent has been received to borrowing £979 for installation of electric lighting at St. George's Rd. school.

Leek U.D.C. Construction of 28 houses on Haregate estate. A. Gilchrist, Architect, Town Hall.

Newcastle - under - Lyme T.C. Negotiations in hand for erection of 43 houses in Windermere Rd., and 144 houses and 4 maisonettes on Earl's Drive estate.

North Riding. Erection of primary school at Haxby. F. Barraclough, secretary for education, County Hall, Northallerton.

Oxfordshire. A fire station is to be built at Hook Norton. G. R. Hulton, 3 Beckett St., Oxford.

Poplar B.C. Scheme approved for development of Priory St. area by erection of 45 dwellings.

Portsmouth. McMurdo Instrument Co. Ltd. are planning to build a factory on Fratton industrial estate. Council recommended to approve plans for 63 flats in King's Rd., Southsea.

Pwllheli T.C. Approval granted for erection of 25 houses in Chirton St.

Reigate. C.C. has approved construction of first instalment of Gatton county primary school. Estimated cost £33,866.

Reigate T.C. Erection of 63 houses on Rushetts Farm estate Borough Engineer and Surveyor, Town Hall.

Ripon and Pateley Bdge. (Yorks) R.D.C. All trades for erection of 30 houses at Summer Bridge. Architect, J. C. Kenyon, Council Offices, Pateley Bridge.

South Shields. Plans prepared for five-storey block of flats in Lowe Rd. Borough Engineer is John Reid.

Walthamstow. Approval granted for extension to Argall Ave. factory of M. Saper Ltd. Architects are Michael Barnett and Bampton, 329 High Holborn, W.C.1.

Windsor T.C. Erection of 28 houses in Imperial Rd. site. Borough Engineer, Kipling Memorial Building, Alma Rd.

OVERSEAS

Egypt. Nile Valley Trading Corpn. wish to obtain agencies for distribution of electrical goods, including cookers, fires, irons, washing machines, refrigerators, vacuum cleaners, carpet cleaners, toasters, etc. Communications to Mr. B. de Bottom, The Corpn., P.O. Box 49, Cairo.

Australia. Nelson and Son Pty., Ltd., Perth, want to obtain agencies for commercial and domestic refrigeration units, domestic washing machines. Contact should be made with Mr. Lindsay, May House, Warren Rd., Blundell Sands, Liverpool.

TRADE MARKS

This information is extracted from the Official Journal be permission of the Controller.

Wave Master. 702,635. Class 7. Washing machines. F. A. Marlow, 51 Chartfield Ave., Putney Hill, S.W.15.

Strong Mogul. 695,511. All goods in Class 11. Strong Electric Corpn., 2501, Lagrange St., Toledo, Ohio, U.S.A.

Cold Canopy. B702,027. Class 11 Portable refrigerated glass display housings. Marco Refrigerators Ltd., Manor Works, Rowan Rd., Streatham Vale, S.W.16.

Vapotron. 700,240. Class 9. Electron-discharge tubes (not for lighting purposes). Compagnie Francaise Thomson-Houston, 173 Boulevard Haussmann, Paris (8e), France.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2

Boseley Repetition Ltd. 222, West Rd., Southend-on-Sea, Essex. General mechanical, marine, motor, aircraft and electrical engineers, etc. Cap.: £150. Dirs.: K. C. Boseley and C. A. Newman.

Brunswick Radio and Television (Walthamstow) Ltd., 103 Wood St., E.17. To take over business carried on at 531 High Rd., Leytonstone, E.11, and 103 Wood St., Walthamstow. Cap.: £3,000. Dirs.: R. T. W. Luxford and Doris M. Luxford.

Caldwell Electro-Mechanisms Ltd., Progress Way, Waddon, Surrey. To take over business of electro-mechanical apparatus carried on at Waddon by Thos. F. Caldwell. Cap.: £2,500. Dirs.: G. P. Dean and T. F. Caldwell.

Circle Works (Blaby), Ltd., 10 Union Court, Old Broad St., E.C.2. Mechanical, electrical and general engineers, etc. Cap.: £100. Dir.: C. L. Lesser.

Gyromax. 702,687. Class 10. X-ray tubes and housings therefor. Newton Victor Ltd., 15/19 Cavendish Pl., W.1.

Neon Excelda Ltd., 11 Sheepcote St., Birmingham. Electrical engineers and manufacturers, electrical installation contractors, etc. Cap.: £5,000. Dirs.: H. D. James and Mrs. H. V. James, and A. Parsons.

W. M. Shakeshaft Ltd., 1-5 Sugar Lane, Manchester 4. Manufacturers of and dealers in artificial lighting apparatus, electrical plant, etc. Cap.: £10,000. Dirs.: W. M. Shakeshaft and Mrs. I. H. Shakeshaft.

Sunrod Ltd. To carry into effect and complete assignment of licence by David Dalin, of 122 East 42nd St., New York, heating and lighting engineers, electricians and manufacturers, etc. Cap.: £33,000. Dirs.: to be appointed by subs. Subs.: I. L. Ivins, 32 Montague Rd., Richmond, Surrey, and H. T. Robinson, Norfolk House, Norfolk St., W.C.2.

Weston and Northam Ltd., 32 North End Rd., W.14. To take over business of electrical engineers and contractors carried on as "Weston and Northam" at North End Rd., W.14. Cap.: £1,400. Dirs.: S. A. Miles and Mrs. D. L. Miles, E. Weston and Mrs. E. M. Weston.

MEETINGS TO NOTE

THURSDAY, JAN. 24

I.E.S. (Bradford Group).—"Church Lighting." L. C. Retting. Y.E.B., Sunbridge Rd., 7.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Birmingham Branch).—"Practical Aspect of Heating and Ventilating." Imperial Hotel, 6.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (London Assoc. Members and Graduates).—"Fuels and Firing Appliances." E. G. Ritchie. 39 Victoria St., S.W.1, 6.30 p.m.

FRIDAY, JAN. 25

A.M.E.M.E. (Yorks S.E. Branch).—"Electrical Insulating Oils." J. V. Worrell. Rotherham Tech. College, 7 p.m.

I.E.S. (Stoke-on-Trent Group).—Annual dinner.

WORCESTER ELECTRIC CLUB.—Annual dinner and dance at The Raven Hotel, Droitwich Spa.

E.P.E.A. (S. Tech. Group).—"Protection of Feeders and Transformers." W. Gray. Municipal Tech. College, Bournemouth.

JNR. INSTN. OF ENGINEERS (London)—"Air Conditioning in Industry." W. W. King. 39 Victoria St., S.W.1, 6.30 p.m.

MONDAY, JAN. 28

I.E.S. (Leeds Centre).—"Television in Yorkshire." J. T. Thornton. 24 Aire St., Leeds, 7 p.m.

I.E.E. (London Radio Group).—Discussion on "Should Further TV Development be Concentrated on Colour to the Exclusion of Black and White?" L. C. Jesty. Savoy Place, W.C.2, 5.30 p.m.

JNR. INSTN. OF ENGINEERS (Sheffield Section).—"Modern Power Station Construction." S. S. Ellam. 201 Napier St., 7.30 p.m.

E.P.E.A. (Glasgow Tech. Group).—"Electrical Measurements in the Electric Supply Industry." W. C. Thompson. Engineering Centre, Sauchiehall St., 7 p.m.

A.S.E.E. (Bournemouth Branch).—"Sports Lighting." D. E. Beard. Grand Hotel, Firvale Rd., 8.15 p.m.

I.E.E. (M.E. Centre).—"Engineering Problems Associated with the Integration of Undertakings in N.E. Electricity Board's Area of Supply." T. M. Ayres. Neville Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Radio Group).—"Crystal Diodes," R. W. Douglas and E. G. James; "Crystal Triodes," T. R. Scott. James Watt Memorial Inst., Gt. Charles St., Birmingham, 6 p.m.

I.E.E. (Western Utilisation Group)—"Steelworks Electrical Equipment." A. W. Ellis. S. Wales Inst. of Engineers, Park Place, Cardiff, 6 p.m.

Instn. of Electronics—"Electronic Spot and Seam Welding Control," Lt. C. R. Bates. Chamber of Commerce, New Street, Birmingham, 7 p.m.

TUESDAY, JAN. 29

SOC. OF INSTRUMENT TECHNOLOGY.—"Some Mechanical Considerations in Design of Electrical Servo Systems." Prof. A. Tustin. Royal Soc. of Tropical Medicine and Hygiene, Portland Place, W.1, 6.30 p.m.

E.C.A. — Annual dinner at Grosvenor House, W.1.

I.E.E. (E. Midland Centre).—"Electrical Characteristics of Ljungstrom Turbo-Alternator Unit." H. T. Price. Loughborough Coll., 6.30 p.m.

I.E.E. (N. Midland Centre).—Discussion on "Is the Scope of Electrical Engineering Courses too Narrow?" R. A. H. Sutcliffe. L.S.B., Aire St., Leeds, 6 p.m.

I.E.E. (N.W. Measurements Group).—"Universal High-Speed Digital Computors: Magnetic Store," Prof. F. C. Williams, T. Kilburn and G. E. Thomas; "Position Synchronisation of Rotating Drum," Prof. F. C. Williams and J. C. West. Engrs. Club., Albert Sq., Manchester, 6.15 p.m.

I.E.E. (S. Midland Centre).—"New Theory of Magnetic Amplifier." A. G. Milnes. Winter Gardens Restaurant, Malvern, 7.15 p.m.

E.A.W. Seventh Caroline-Haslett Trust Lecture: "Ideas from Switzerland: Electricity in the Home." Miss K. E. Piatt. I.E.E., Savoy Place, W.C.2, 6 p.m.

A.M.E.M.E. (N.W. Branch).—"H.M. Principal Electrical Inspector of Mines' Report for 1950." J. Cowan.

WEDNESDAY, JAN. 30

I.E.E. (London Supply Group).—"Economic Plant Sizes and Boiler Set Groupings on British Grid." B. Donkin and P. H. Margen. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N.E. Scotland sub-centre).—Chairman's address by P. Butler. Caledonian Hotel, Union Terrace, Aberdeen, 7.30 p.m.

I.E.E. (S.W. sub-centre).—"Development of Electrical System on Bristol Brabazon Aircraft." M. J. J. Cronin. Elect. Offices, Taunton, 3 p.m.

THURSDAY, JAN. 31

I.E.E. (Rugby sub-centre).—The Rugby Engineers' Ball at Co-operative Hall.

I.E.S. (Exeter Group).—"Lighting of New House of Commons." C. Dykes Brown. Providence Hall, Northernhay St., 7 p.m.

I.E.E. (S. Midland Centre).—Discussion on "Laboratory Work for Electrical Machines." A. Draper. James Watt Memorial Inst., Birmingham, 6 p.m.

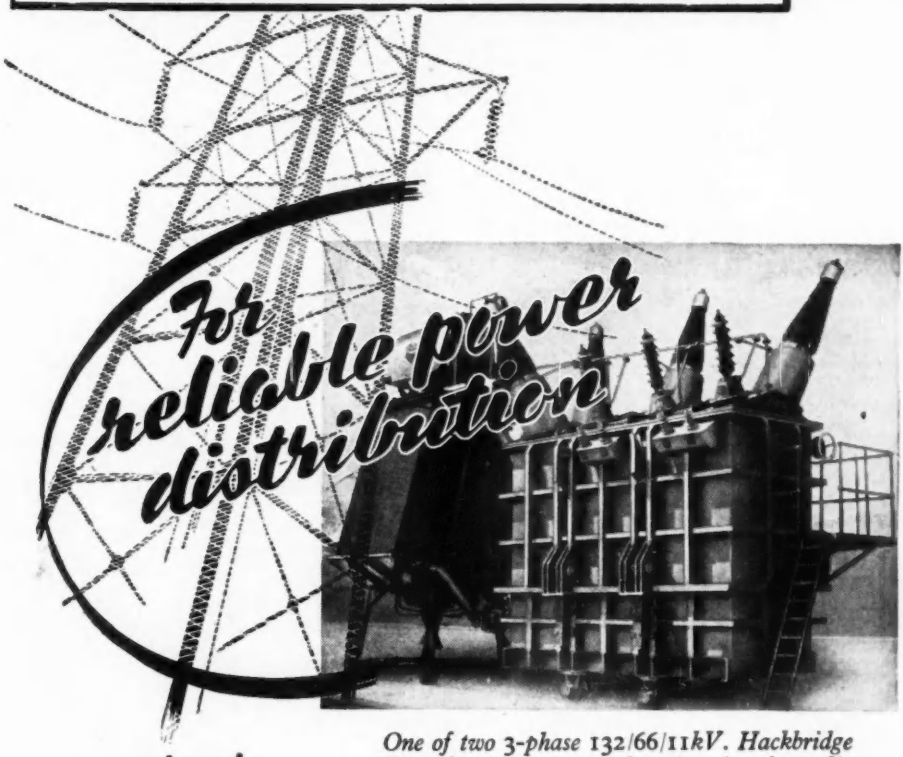
A.S.E.E. (Luton Branch).—"A Camera and the Engineer." G. E. Whalley. George Hotel, 8 p.m.

A.M.E.M.E. (Lothians Branch).—"Refinery Electrification." F. N. Beaumont and G. A. McLennon.

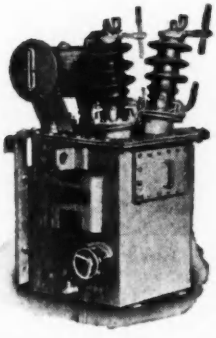
FRIDAY, FEB. 1

INSTN. OF MECH. ENGRS.—"Powered Flying Controls: Design." F. J. Bradbury and S. M. Parker. Storey's Gate, S.W.1, 5.30 p.m.

HACKBRIDGE
TRANSFORMERS



One of two 3-phase 132/66/11kV. Hackbridge Transformers at a substation in Australia



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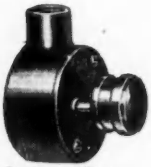

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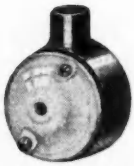

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BEDWORTH URBAN DISTRICT COUNCIL

PROVISION OF CLASS "B" LIGHTING

TENDERS are invited for the provision and erection of 103 reinforced concrete lamp columns 15 ft. high, together with the provision and installation of 80 W mercury-vapour lamps and all equipment. Specifications, forms of tender, and full details may be obtained from the Engineer and Surveyor to the Council, 134 Newtown Road, Bedworth, on receipt of a deposit of 3 gns., which will be returned on receipt of a bona fide tender. Tenders in the envelopes provided, endorsed "Tender for street lighting," must be in the hands of the undersigned not later than 10 a.m. on Saturday, February 9, 1952. The Council do not bind themselves to accept the lowest or any tender.

R. E. HUBAND,
Clerk of the Council.

Council Offices, High Street,
Bedworth, Nr. Nuneaton.
January 15, 1952. (P 696)

EAST RIDING OF YORKSHIRE COUNTY COUNCIL

Withernsea County Secondary School

TENDERS are invited for the INSTALLATION OF ELECTRICAL SERVICES at the above school now in course of erection.

Applications for contract documents should be made to the County Architect, County Hall, Beverley.

Contractors should be members of the Electrical Contractors' Association.

No tender will be considered unless received by the undersigned by not later than 4 p.m. on Tuesday, March 11, 1952, in a plain sealed envelope supplied by the Council, endorsed "Tender—Withernsea County Secondary School, Electrical Installation," and which shall not bear any name or mark indicating the sender.

The Council does not bind itself to accept the lowest or any tender.

T. STEPHENSON,
Clerk of the Council.

County Hall,
Beverley.
January, 1952. (P 735)

COUNTY BOROUGH OF DEWSBURY

Street Lighting Department

TENDERS are invited by the above Corporation for the supply of:—
BIJOU AND NO. 2 MANTLES.
ELECTRIC LAMPS.
ELECTRIC CABLE.
100-200 watt LANTERNS with Swan-neck Brackets.
300-500 W LANTERNS.
GAS LANTERNS.
Cast-iron, Steel, and Concrete LIGHTING STANDARDS.
UNIFORM JACKETS.

Form of tender, schedule and general conditions, and any further information required can be obtained from C. H. Midson, M.B.E., Street Lighting Engineer, 27 Battye Street, Dewsbury, Yorkshire.

Tenders, enclosed in a plain sealed envelope, endorsed "Tender for Electric Lamps," or any of the other specified materials, must be sent to me by noon on Thursday, February 28, 1952.

A. NORMAN JAMES,
Town Clerk.

Town Hall, Dewsbury,
Yorkshire.
January 19, 1952. (P 766)

BOROUGH OF BUXTON

STREET LIGHTING

TENDERS are invited for the supply and installation of 12 No. lanterns, MAF/V 400 W lamps, control gear and concrete columns for Group "A" lighting on London Road A.515 within the Borough.

Tenders are also invited for the supply and installation of 24 No. lanterns, MBF/V 80 W lamps, swan-neck pillar mounting conversion brackets incorporating box and control gear, for Group "B" lighting on three roads within the Borough. Columns will be provided for erection.

Documents may be seen at, and specification, quantities and forms of tender obtained from, the office of the Borough Engineer, Town Hall, Buxton, upon payment of a deposit of two guineas, which will be refunded on receipt of a bona-fide tender not subsequently withdrawn.

Tenders, in envelopes provided, endorsed "Street Lighting Installations," must be delivered to the undersigned not later than 10 a.m. on Monday, February 11, 1952.

The Council do not bind themselves to accept the lowest or any tender.

H. C. HOGGETT,
Town Clerk.

Town Hall,
Buxton.
January 17, 1952. (P 737)

BOROUGH OF SOUTHGATE

IMPROVEMENT OF STREET LIGHTING ON MAIN ROADS

TENDERS are invited for the following contracts in connection with the improvement of street lighting to Group A standard on certain main roads within the Borough:—

(a) Supply only of 135 No. LANTERNS AND CONTROL GEAR for 250W Mercury Vapour Discharge Lamps.
(b) Supply and erection of 135 No. CONCRETE LAMP STANDARDS and fixing 135 No. Lanterns, control gear, wiring, etc.

Separate contract documents will be issued and contractors may tender for one or both contracts.

Contractors wishing to tender should make written application to the Borough Engineer and Surveyor not later than Friday, February 1, 1952.

Instructions for tendering and the closing date for the receipt of tenders will be shown on the relevant documents.

The Council do not bind themselves to accept the lowest or any tender.

GORDON H. TAYLOR,
Town Clerk.

Southgate Town Hall,
Palmers Green,
London, N.13.
January 16, 1952. (P 734)

COUNTY BOROUGH OF GREAT YARMOUTH

CONTRACT FOR ELECTRIC CABLES

THE COUNCIL are prepared to receive tenders for the supply of Electric Cables for a period of one year from April 1, 1952.

Specification, form of tender and conditions of contract may be obtained from the Borough Engineer, Town Hall, Great Yarmouth. Tenders, upon the form supplied, in plain sealed envelopes, endorsed "Tender for Cables," must be delivered to me not later than Wednesday, February 6, 1952.

The Council do not bind themselves to accept the lowest or any tender.

FARRA CONWAY,
Town Clerk.

Town Hall, Great Yarmouth.
January 15, 1952. (P 767)

CITY OF PETERBOROUGH

THE COUNCIL invites tenders from recognised Electrical Contractors for the ELECTRIC LIGHTING and POWER INSTALLATIONS to 50 permanent houses on the Mountsteven Avenue Estate, Peterborough.

Drawings, specifications and forms of tender may be obtained on application to Mr. F. J. Smith, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications, before noon on Saturday, February 2, should be accompanied by a cheque for the value of £2 2s. 0d., made payable to the Peterborough City Council, which will be returned on receipt of a bona fide tender or the return of the documents.

The Council does not bind itself to accept the lowest or any tender.

C. PETER CLARKE,
Town Clerk.

Town Hall,
Peterborough.
January 17, 1952. (P 741)

CITY OF MANCHESTER

STREET LIGHTING EQUIPMENT

THE CITY COUNCIL is prepared to receive tenders for the supply of Group B concrete lighting columns during the year ending December 31, 1952.

Forms of tender may be obtained on application to the City Surveyor (Room 329), Town Hall, Manchester 2, and completed tenders must be returned to the Chairman of the Highways Committee, Town Hall, Manchester 2, not later than 10 a.m. on Wednesday, February 6, 1952.

The Corporation does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
Manchester 2.
January 23, 1952. (P 736)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

Midlands Division

TWO GENERAL ASSISTANT ENGINEERS required in Technical Department, Headquarters, Birmingham. National Joint Board service conditions, superannuable appointments, salary in accordance with Schedule "C," Grade 8, commencing in range £481 to £619, ultimately rising to £674.

University degree or Higher National Certificate in Electrical Engineering required. Previous experience in electrical manufacturing or supply industry and knowledge of protection gear or system planning an advantage.

Forms of application obtainable from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by February 9, 1952.

F. W. LAWTON,
Divisional Controller.
(P 745)

ELECTRICITY SUPPLY COMMISSION

(Southern Rhodesia)

APPLICATIONS are invited for the following vacant posts on the permanent staff of the Electrical Department :—

The General Conditions of Service include a contributory pension scheme, Medical Aid Society, Holiday Fund; 45 days full-pay leave per annum, paid sick leave, initial sea and rail fares subject to agreement to remain in the service of the Electricity Supply Commission for a minimum of three years. In addition to the basic salaries at present a cost-of-living allowance of approximately 38% applies. Also, children and dependant allowances, where applicable. Appointment subject to medical examination and three months' probationary period.

INSTALLATION SECTION:

TECHNICAL ASSISTANT, Grade I.—Applicants must be A.M.I.E.E., between the ages 30 and 40 and with experience in operation and maintenance of indoor and outdoor substations from 11 kV up to 132 kV, with O.L.T.C., remote control and auto-reclosing switchgear. Salary scale: £693 x £31/10/- to £787/10/- p.a.

CONTRACTS SECTION:

TECHNICAL ASSISTANT, Grade I.—Applicants must be A.M.I.E.E., between the ages 30 and 40 and should be capable of drawing up specifications. Preference will be given to applicants who have had experience with consulting engineers. Salary scale, £693 x £31/10/- to £787/10/- p.a.

Applications, giving age, educational and technical training details and qualifications, subsequent experience in chronological order, nationality, marital state with number and age of dependants and enclosing copies of testimonials (which will not be returned) should be addressed to the Secretary, Electricity Supply Commission, P.O. Box 377, Salisbury, Southern Rhodesia, so as to arrive not later than February 20, 1952. (P 630)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

MAINTENANCE ENGINEER (electrical) required at Meaford Generating Station, National Joint Board Service Conditions, superannuable appointment. Commencing salary in accordance with Schedule A, Class "G," Grade 6, £762 per annum.

Higher National Certificate in electrical engineering or equivalent qualification. Sound experience in power station electrical maintenance.

Application forms obtainable from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13. Closing date, February 2, 1952.

F. W. LAWTON,
Divisional Controller.
(P 697)

MIDLANDS ELECTRICITY BOARD

South Staffs. and North Worcs. Sub-area

APPOINTMENT OF 2ND ASSISTANT ENGINEER (CONSTRUCTION)

APPLICATIONS are invited for the position of Second Assistant Engineer (Construction) at Sub-Area Headquarters, Toll End Road, Tipton. The duration of the appointment will be approximately 3½ years, and the successful applicant will be required to act as site engineer in charge of the reconstruction of the M.E.B. main distribution control at the Ocker Hill Generating Station of the Midlands Division.

Applicants should be preferably Corporate Members of the Institution of Electrical Engineers and should have had considerable experience in the construction of large sub-stations, erection of switchgear, and the installation of underground cables of voltages up to and including 33 kV, both by direct labour and by contract.

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry, and the salary will be in accordance with Class "L," Grade 7, £901 per annum.

Applications, stating age, education, qualifications, experience, present position and salary, should be forwarded within fourteen days to Sub-Area Manager, (Ref. C.W.), Midlands Electricity Board, Toll End Road, Tipton, Staffs.

A. STEPHENS,
Secretary.
January 16, 1952. (P 742)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

SHIFT CHARGE ENGINEER
Cambridge Generating Station.

Salary in accordance with the N.J.B. Schedule "A" Class "B," Grade 7 (£539-£566 per annum).

Applicants should have served an apprenticeship and obtained an Ordinary National Certificate in Electrical and/or Mechanical Engineering or equivalent and possess experience in the operation of generating stations.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 4, 1952. Envelopes should be endorsed "Shift Charge Engineer—Cambridge."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 726)

CROWN AGENTS FOR THE COLONIES

ELECTRICAL SUPERINTENDENT required by the Government of Tanganyika for the Public Works Department. Salary according to age and war service in the scale £630, rising to £880 a year, plus emergency allowance at present 20 per cent. of salary. Outfit allowance up to £45. Free passages. The appointment will be on probation for permanent and pensionable employment. Liberal leave on full salary after each tour of 24 to 30 months. Candidates, under 40 years, must have served a full apprenticeship with an electrical engineering firm or electrical contractors and have had a further five years' experience as a journeyman. They must hold a National Certificate and be fully conversant with I.E.E. regulations relating to public buildings and factories. A knowledge of the overhaul and repair of electric motors, dynamos and switchgear is essential.

Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting on letter "M.29059.B." The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 659)

CROWN AGENTS FOR THE COLONIES

CHARGEMAN ELECTRICIAN required by the Government of Tanganyika for one tour of 24 to 36 months. Salary according to age between £580 and £650 a year, plus emergency allowance at present 20 per cent. of salary. Gratuity at the rate of £15 for each completed three months satisfactory service. Outfit allowance up to £45. Free passages. Liberal leave on full salary. Candidates must have completed a full apprenticeship with an electrical engineering firm or electrical contractors, and have had at least five years' experience on electrical installations, together with wiring and testing of new buildings. They must be fully conversant with the I.E.E. regulations relating to public buildings and factories.

Apply at once by letter, stating age, full names, in block letters and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting on letter "M.29056.B." The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 661)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified persons for the following position:—

7/52 1ST ASSISTANT CHEMIST, STAYTHORPE

Candidates should preferably possess the Higher National Certificate in Chemistry or its equivalent, and should have had practical experience in the analysis of coal, water and oil, etc., in so far as they concern Power Stations.

The salary for the above appointment will be in accordance with Grade 9, Class "J" (£699 to £728 p.a.) of the N.J.B. Agreement, and the position will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, Barker Gate, Nottingham, and should be returned not later than February 11, 1952.

L. F. JEFFREY,
Divisional Controller.

January 18, 1952. (P 743)

MIDLANDS ELECTRICITY BOARD

Birmingham and District Sub-Area

APPOINTMENT OF DISTRICT ENGINEER

APPLICATIONS are invited for the position of District Engineer in the South-western District of the Birmingham and District Sub-Area.

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications, and must have had extensive experience in the operation and maintenance of high and medium voltage distribution networks and associated switchgear, transformers and protective systems.

The appointment will be in accordance with the National Joint Board conditions, the salary being Class "G," Grade 3, £946 per annum.

Applications, stating age, present position and salary, and giving full details of experience and qualifications, endorsed "District Engineer," should be forwarded within fourteen days to Emil Braathen, Manager, Birmingham and District Sub-Area, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.

January 16, 1952. (P 740)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments:—

JUNIOR ENGINEERS—Brimsdown Generating Station

Salary in accordance with Clause 35 of the N.J.B. Agreement, Schedule A, Class "J," Grade 18 £375 to Grade 14 £524 per annum plus London Weighting (£25 to £26 per annum).

The duties of the successful applicants will include assisting in the Control Room on shift and other operational and investigational duties. Preference will be given to applicants who have had previous experience in a Generating Station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

The appointments will be Superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 4, 1952. Envelopes should be endorsed "Junior Engineers—Brimsdown."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 725)

UNIVERSITY OF SYDNEY

APPLICATIONS are invited for the following positions:—

TWO LECTURESHIPS IN ELECTRICAL ENGINEERING (Power).

LECTURESHIP IN ELECTRICAL ENGINEERING (Electronics).

The above vacancies mainly arise from a decision to establish permanent lectureships in place of temporary or part-time appointments.

Salaries will be within the range of £A650 by £A50 to £A1,000, with the addition in all cases of cost-of-living adjustment (at present £A159 males, £A121 females). Salaries will be subject to deductions under the State Superannuation Act. The commencing salaries will be fixed according to the qualifications and experience of the successful candidates.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 5 Gordon Square, London W.C.1.

The closing date for the receipt of applications is March 3, 1952. (P 698)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT SENIOR CLERK

Dorking and Epsom District

SALARY of £620 by £20 to £680 p.a. under N.J.C. Agreement Grade 5, or £680 by £25 to £755 under N.J.C. Agreement Grade 6, according to experience and ability. Superannuation will be arranged. The districts of Dorking and Epsom are being amalgamated from January 1, 1952, and the vacancy arises in the combined district. Applicants should have good organising and administrative ability and experience in the control of staff.

Applications, on forms obtainable from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Road, Dorking, Surrey, to be returned by February 4, 1952.

A. L. BURNELL,
Secretary.

January, 1952. (P 744)

BRITISH ELECTRICITY AUTHORITY

London Division

GENERAL ASSISTANT ENGINEER (TECHNICAL DEPARTMENT, DEVELOPMENT SECTION)

APPLICATIONS are invited from candidates who possess first-class technical qualifications and who have an aptitude for carrying out system development investigations on their own initiative.

Salary in the scale £506 to £728 14s. inclusive of London Allowance, N.J.B. Schedule C, Class "AX/EX", Grade 8. The post is superannuable.

Applications stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1, to be received within 14 days of the appearance of this advertisement.

H. V. PUGH,
Divisional Controller.

(P 702)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments within the Chief Engineer's Department, Area Board Headquarters.

SECOND ASSISTANT ENGINEER (Planning and Development).

Applicants should preferably possess an honours degree in electrical engineering and should be corporate members of the Institution of Electrical Engineers. They should have had works experience of manufacture and design of distribution plant, and of the design, construction and operation of a 33 kV distribution system. A specialised knowledge of one of the branches of system design, such as overhead line or cable design, substation design and construction, special investigation into economic problems of distribution or statistical treatment of problems, would be an advantage.

Salary: N.J.B. Agreement, Schedule C, Class "AX/CX," Grade 2, £809 to £945, rising to £1,000 per annum.

THIRD ASSISTANT ENGINEER (Planning and Development).

Applicants should possess a degree in electrical engineering and should be corporate members of the Institution of Electrical Engineers. They should have had works experience of manufacture and design of distribution plant, and preferably have had some experience of the design, construction and operation of a 33 kV distribution system. A specialised knowledge of some branch of distribution engineering would be an advantage.

Salary: N.J.B. Agreement, Schedule C, Class "AX/CX," Grade 5, £629 to £765, rising to £810, per annum.

The appointments will be superannuable. Forms of application may be obtained from the undersigned, to whom completed forms should be returned within 14 days from the appearance of this advertisement.

J. MEEK,
Secretary.

62 Dalziel Drive, Glasgow S.1.
January 15, 1952. (P 703)

BRITISH ELECTRICITY AUTHORITY

North Western Division

REQUIRES DRAUGHTSMEN (mechanical) and DRAUGHTSMEN (electrical) in the Generation (Construction) Department at Agecroft, Salford. Salaries £413 to £547 engineering draughtsmen (N.J.B. Grade 6); or £547 to £651 senior draughtsmen (N.J.B. Grade 5).

Apply to Establishments Officer, British Electricity House, 825, Wilmslow Road, Manchester 20, before February 2. Quote Vacancy No. 631/2. (P 705)

GOVERNMENT OF KUWAIT

MAINS ENGINEER

APPLICATIONS are invited for an appointment as Mains Engineer with the Government of Kuwait.

Applicants should have technical qualifications leading to Associate Membership of the I.E.E. or equivalent, and be aged between 30 and 40.

Experience should include at least five years' service in the mains department on h.v. and l.v. networks; erection l.v. and 11 kV overhead lines; supervision of cable laying and jointing; testing up to 11 kV; erection of substations, switchgear, etc. and testing of protective relays; maintenance of networks, switchgear, transformers, etc., fault localisation and repairs. Salary £1,200 (FREE OF INCOME TAX) per annum by annual increments of £40 to £1,280 per annum. Free furnished quarters, messing, air conditioning, electricity, water and medical attention. Two years' contract with option of extension if suitable. Four months' leave on full pay after completion of two years' service. One free air passage out and home per contract. Subject to applicant producing medical certificate of fitness for duty in the Persian Gulf.

No married accommodation will be available for at least the first year of service, but efforts will be made to provide it as soon as possible.

Applications should be addressed to Messrs. Ewbank and Partners Ltd., 10/11 Grosvenor Place, London S.W.1. (P 747)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment in the Technical (Electrical) Department at Divisional Sub-Headquarters, West Farm Place, Cockfosters:—

GENERAL ASSISTANT ENGINEER (General Section)

Salary in accordance with the N.J.B. Agreement, Schedule C, Grade 8, Class "AX" (£481 to £619 per annum plus London weighting).

The commencing salary will depend upon qualifications and experience.

The duties of the post will be assisting with the testing and commissioning of electrical plant and maintenance of protective gear in generating stations and sub-stations.

Applicants should preferably be Graduate or Corporate Members of the Institution of Electrical Engineers.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 4, 1952. Envelopes should be endorsed "General Assistant Engineer (General Section)."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 701)

GOVERNMENT OF IRAQ

CHIEF MECHANICAL AND ELECTRICAL ENGINEER required by the Directorate General of Municipalities, Iraq, for a tour of 24 years in first instance. Salary I.D. 200 a month, plus cost-of-living allowance between I.D. 10 and I.D. 14 a month, according to dependants. (I.D. 1—£1.) The post is non-pensionable, but there is a Provident Fund. Free passages. Candidates must be Corporate Members of the Institution of Mechanical Engineers or the Institution of Electrical Engineers, and have a sound technical knowledge and suitable experience in both electrical and mechanical engineering. They must be capable of undertaking the design of a.c. and d.c. public lighting systems and be fully acquainted with the installation, maintenance and operation of diesel-electric generating plants and electrically driven pumping units, and the layout and construction of h.t. and l.t. overhead lines.

There is also a vacancy for a MECHANICAL AND ELECTRICAL ENGINEER. Salary not less than I.D. 150 a month, plus cost-of-living allowance. Other details as above.

Candidates will be considered for either appointment.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents, 4 Millbank, London S.W.1, quoting on letter M.24754.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 699)

BRITISH ELECTRICITY AUTHORITY

Southern Division

BRITISH ELECTRICITY AUTHORITY (Southern Division) invite applications for positions as ASSISTANT SECTION ENGINEERS.

The salary will be N.J.B. Grade 6 (£564 to £740). Candidates should hold qualifications leading to corporate membership of the Institution of Electrical Engineers or its equivalent.

Applicants should have had experience in the maintenance and operation of a high voltage system up to 132 kV, including both cable and overhead line work. Manufacturing works experience with high voltage transformers and/or switchgear is desirable, and a knowledge of overhead line construction work will be an advantage.

Forms of application may be obtained from P. D. A. Oliver, Esq., Divisional Secretary, 111 High Street, Portsmouth, and should be returned not later than Wednesday, February 6, 1952. (P 764)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT TO PURCHASING OFFICER

APPLICATIONS are invited for the post of Assistant to the Divisional Purchasing Officer at these Headquarters.

Applicants should have experience of buying maintenance supplies, general engineering and electrical equipment as required for generating stations and transmission sections, together with a sound knowledge of internal purchasing procedure, including trade inquiries, records, follow up, and the organisation of stores.

The salary will be in accordance with Grade 3 of the National Joint Council Agreement (£500-£560 per annum).

The post will be superannuable within the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, B.E.A., Barker Gate, Nottingham, and should be returned not later than February 4, 1952. Applicants who have previously applied for this position need not re-apply.

L. F. JEFFREY,
Divisional Controller.

January 11, 1952. (P 691)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

JUNIOR ENGINEER
Norwich Generating Station

Salary in accordance with Clause 35 of the National Joint Board Schedule A, Class "F" Grade 15, £375, to Grade 14, £447 per annum, depending on qualifications.

Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 4, 1952. Envelopes should be endorsed "Junior Engineer—Norwich."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 700)

LONDON ELECTRICITY BOARD

ENGINEER (TEST)

APPLICATIONS are invited for the above position in the meter and testing branch at Beckenham, Kent. The successful candidate must, however, be prepared to work anywhere within the sub-area.

Applicants should have a sound technical education and preferably have obtained the Higher National Certificate in Electrical Engineering or equivalent qualification, and possess practical experience in general distribution work, and a specialised knowledge on the testing of protective equipment, high voltage cables, switchgear and transformers, and be able to carry out cable fault location and general testing work on the high voltage systems.

The post is graded under Schedule A of the National Joint Board agreement as Class "K," Grade 13—£591 3s. per annum rising to £614 5s. per annum, inclusive of London allowance.

Application forms, from Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by February 4, 1952. Please enclose addressed envelope and quote ref. V/1392/T on all correspondence. (P 769)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable positions. Salary and conditions of service will be in accordance with the National Joint Board Agreement.

MAINTENANCE ENGINEER (ELECTRICAL)
Acton Lane Generating Station

Candidates should have served a recognised engineering apprenticeship and have a sound technical background, with wide experience in the maintenance of switchgear up to 22,000 V and large power transformers, motors, starters, etc.

A thorough knowledge of the N.J.I.C. Agreement is essential.

Salary, Class "H," Grade 7, i.e. £784 7s., inclusive of London Allowance.

STATION SHIFT CONTROL ENGINEER—
Lombard Road Generating Station

Candidates should have suitable technical qualifications and previous practical experience in the control and operation of steam generating plant and h.t. switchgear.

Salary, Class "F," Grade 10, i.e. £584 17s., inclusive of London Allowance.

SHIFT CHARGE ENGINEER—
Taylors Lane Generating Station

Candidates should have technical qualifications up to Higher National Certificate standard, including thermodynamics as a subject, together with a good general education. Considerable experience in the operation of a modern power station is essential and must include experience on modern high pressure plant and of switchgear connected with a large distribution system. Character and ability to deal with staff problems is important.

Salary, Class "F," Grade 7, i.e., £710 17s., inclusive of London Allowance.

MAINTENANCE ENGINEER (MECHANICAL)—
Brunswick Wharf Generating Station

Candidates should have received a sound engineering training and have had wide experience in the maintenance of modern generating plant.

Salary, Class "H" (anticipated "K" in 1956), Grade 7, i.e. £784 7s., inclusive of London Allowance.

ASSISTANT SHIFT CHARGE ENGINEER—
Fulham Generating Station

Candidates should have had a sound engineering training and possess technical qualifications up to Higher National Certificate standard, followed by experience with large modern generating station plant.

Salary, Class "L," Grade 9, i.e. £825 6s., inclusive of London Allowance.

SHIFT CHARGE ENGINEER—
Hackney Generating Station

Candidates should have received a sound electrical and mechanical training and have experience in the efficient operation of a generating station. Character and ability to deal with staff problems is important.

Salary, Class "F," Grade 7, i.e. £710 17s., inclusive of London Allowance.

Applications, stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1, and be received not later than fourteen days after the appearance of this advertisement.

H. V. PUGH,
Divisional Controller
(P 746).

LONDON ELECTRICITY BOARD

ASSISTANT INSTALLATION SUPERVISOR

APPLICATIONS are invited for the above position in the Beckenham/Bromley district.

The applicant appointed will be required to assist the supervisor in the preparation of specifications and estimates, and in the supervision of all activities of the electrical contracting section.

Pending grading of the post under the National agreement of the appropriate negotiating body, the provisional salary will be fixed according to qualifications and experience, up to a maximum of £530 per annum inclusive.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by February 4, 1952. Please enclose addressed envelope and quote ref. V/1365/T on all correspondence.
(P 768)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ASSISTANT TO TECHNICAL DIRECTOR required by company engaged in the production of temperature control equipment. Age around 30. Hons. Engineering Graduate or Diploma equivalent, practical training essential. Must be capable of original research, development and design, and have a knowledge of electronics. Initial salary £700 to £900, depending on experience. Pension scheme. Excellent prospects for suitable candidate. —Write 0916, Wm. Porteous and Co., Glasgow. (P 758)

ASSISTANT RATE-FIXER required for industrial switchgear. Applicants should have experience in this work particularly for machine shop and be capable of estimating times from blue prints. Applications in writing, giving particulars of age, training, experience and salary expected to Employment and Welfare Manager, Johnson and Phillips, Ltd., Victoria Works, London, S.E.7. (P 708)

BRITISH CELANESE, LTD. require the services of an ASSISTANT ELECTRICAL ENGINEER, aged 28-35 years. Applicants should hold a university degree and/or be an associate of the Institution of Electrical Engineers: and having served a five years' indentured apprenticeship in the installation and maintenance of heavy electrical equipment in an oil refinery or large chemical factory. Professional experience is required relative to the design, construction and maintenance of extensive e.h.t. and l.t. cable networks, high-powered switchgear installations, automatic relay protective systems, multimotor control equipment and power and lighting installations for large chemical plants.—Replies to be addressed to: Appointments Officer, British Celanese Ltd., Spondon, Derby. (P 605)

CONTRACT AND TENDERING ENGINEERS required for switchgear department. Men aged 21 to 30, with experience of l.t. and h.t. switchgear up to 11 kV are invited to apply. Knowledge of 33 kV gear would be an advantage. First-class conditions with non-contributory pension scheme. Possible housing assistance.—Please apply, giving full details of training, experience, age, etc., to the Chief Personnel Officer (E.D.), The Brush Electrical Engineering Co., Ltd., Loughborough, Leicestershire. (P 730)

CONTRACTORS require OVERHEAD LINESMEN for work on h.t. and l.t. lines.—Write, stating experience, to Box No. 1361, Electrical Times. (P 656)

DRAUGHTSMAN required for London office, engaged on overhead transmission line work. Duties include preparation of general arrangement and detail drawings of supporting structures, etc. Pension fund. Staff canteen. 5-day week. Salary according to qualifications and experience.—Apply in writing to Staff Officer, British Insulated Callender's Construction Co., Ltd., 21 Bloomsbury Street, London W.C.1. (P 731)

DRAUGHTSMAN required for contracts section, experienced on flat back and cubicle-type switchgear, and able to do diagrams. SWITCHGEAR DEVELOPMENT DRAUGHTSMAN also required, with experience on switchgear and motor control gear. Good salary offered for suitably qualified applicants. Pension scheme available.—Reply, stating age, salary and full details of technical qualifications and experience, to Erskine, Heap and Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (P 671)

DRAUGHTSMEN required in Central London by a large firm engaged in light electrical and mechanical engineering. Vacancies exist in design and development d/o and jig and tool design d/o for fully trained junior, intermediate, senior and section leader grades. Salaries will be not less than established rates and will be adjusted according to ability and experience. The work is interesting and conditions are good, with a progressive firm.—Applications, with full details of age, training and experience, should be addressed to Box No. 1393, Electrical Times. (P 719)

DRAWING AND TRACING, LTD., have vacancies for experienced SENIOR DRAUGHTSMEN and JUNIOR DETAIL DRAUGHTSMEN in their production drawing office, specialising in radio, electrical and mechanical engineering. 5-day week. Pension scheme. Good working conditions. Salary range £390-£533.—Write, stating age and experience, 456 Ewell Road, Surbiton, Surrey. (P 721)

ELECTRICAL DRAUGHTSMAN with some knowledge of motor starting resistance design preferred, but not essential. Age between 22 and 30 years.—Write, stating experience and salary required to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (P 750)

ELECTRICAL ENGINEER required with some knowledge of switchgear or resistance manufacture. Applicants should be between the ages of 22 and 30 years. —Write, in first instance, stating experience and salary required, to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (P 749)

EXPERIENCED SALES CORRESPONDENT required by electrical manufacturing company in North London. Knowledge electrical engineering an advantage. Age 25 to 30. Please give full particulars and indication of salary.—Box No. 1395 Electrical Times. (P 720)

ENGINEERS, aged 25 to 40 years, required for senior and junior positions in test and service department (based on London). Duties involve starting-up, efficiency testing, and service work chiefly on land water-tube boilers up to power station capacities. Experience of this or similar type of work is desirable. Applicants holding M. of T., naval watch-keeping or equivalent certificate preferred. Works apprenticeship essential. Salary from £600 to £750 per annum according to qualifications. Contributory pension scheme.—Apply, in writing, stating age, full particulars of experience and qualifications to Foster Wheeler Limited, 3 Ixworth Place, S.W.3. (P 770)

ENGINEER required by a private limited company engaged in electrical contracting and sale of electrical appliances, radio and television in busy East Lancashire town. Experience of all systems of wiring, testing, diagnosis and repair of faults in industrial and domestic equipments required. Successful applicant will be required to organise and manage installation and servicing work in conjunction with the managing director. Opportunity will be given to a keen man, on proving his ability, to acquire an interest in the company, if desired, and to participate in a profit-sharing scheme. —Please give particulars of age, training, experience in control of men, references and salary required. Box No. 1413, Electrical Times. (P 763)

FERRANTI LIMITED have vacancies for qualified DRAUGHTSMEN in the Transformer Department for: (a) design of distribution transformers up to 100 kVA. Previous transformer experience desirable but not essential. (Ref. TDO(D)). (b) Design and layout of plant. (Ref. TDO(P)). Permanent staff appointments with pension benefits.—Forms of application from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote appropriate reference. (P 748)

GRADUATE ELECTRICAL ENGINEERS required to be trained as designers of electrical equipment for Diesel-electric locomotives. Practical workshop experience of manufacture and testing of this equipment preferred, together with good Honours Degree in electrical engineering. Age range 25-30 years. Good salary, prospects and facilities for advanced technical education. Excellent working conditions.—Please reply in confidence to Box No. 1375, Electrical Times. (P 642)

IMPERIAL CHEMICAL INDUSTRIES, LTD., General Chemicals Division, invite applications for the position of ASSISTANT ENGINEER in the company's power department, Runcorn, to take charge of the operation of a number of groups of Lancashire and Economic type boilers. Applicants, who should not be more than 40 years of age, should have had a sound practical and technical training in mechanical engineering and should hold a Higher National Certificate in Mechanical Engineering or equivalent qualification. They should have had good experience of the operation and maintenance of steam boilers and their auxiliaries and should be able to carry out investigations into the thermal performance of such plants.—Apply in writing, giving full particulars, to Staff Manager, Imperial Chemical Industries, Ltd., General Chemicals Division, Cunard Building, Liverpool 3. (P 714)

INSTRUMENT MECHANICS, used to installation, maintenance and calibration of liquid level temperature, Pressure and flow control instruments used in oil industry. Previous experience essential.—Apply to Box No. 1401, Electrical Times. (P 723)

JUNIOR TECHNICAL ASSISTANT required in the sales office of a leading firm of rheostat manufacturers in Birmingham.—Write for interview, giving details of training and experience, Box No. 1371, Electrical Times. (P 640)

LANCASHIRE and Yorkshire: FILTRATION AND ELECTRICAL INSULATION EXPERT wanted with connection as Sales Representative. Applicants must have drive and knowledge to develop interest and achieve sales of synthetic cloths for mechanical use, electrical insulation, industrial filtration, etc., and should have the vision to open up new outlets. The right man will receive an attractive salary, commission and expenses.—Handwritten applications should state age, experience, Box No. 1407, Electrical Times. (P 751)

LARGE Scottish electrical contractors, carrying on work in all areas of Britain, are prepared to accept applications from ELECTRICAL ENGINEERS and kindred trades, men with experience in overhead transmission, erection survey design and draughtsmen, site engineers and linesmen, cabling engineers, electrical estimators and invoicing clerks, electricians and chargehands. Good prospects and superannuation scheme.—Apply, giving full particulars of qualifications, age and salary expected, to Box No. 1385, Electrical Times. (P 668)

LEADING correspondence college seeks the assistance of an AUTHOR to prepare a course of study in refrigeration.—Apply, giving full details of qualifications and experience to Box No. 1397, Electrical Times. (P 721)

LEADING AND SENIOR DRAUGHTSMEN required for transformer work of the largest class.—Apply by letter, quoting "Transformer" and giving full details of age, experience and salary required to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (P 595)

LIGHTING ENGINEER required. Excellent prospects for man possessing full technical knowledge and accustomed to preparation of fluorescent lighting schemes. London district. Replies treated in strict confidence.—Box AC 68910, Samson Clarks, 57-61 Mortimer Street, W.1. (P 719)

MODERN switchgear factory in pleasant surroundings with housing available for married men, has the following vacancies: (a) DESIGN ENGINEER to take charge of current and new projects 33 kV and 66 kV metal-clad and outdoor oil circuit breaker equipment. (b) DESIGN DRAUGHTSMEN with experience of oil circuit breaker equipment up to 66 kV. Expenses paid for interview; superannuation scheme.—Applicants should give full particulars of previous experience, qualifications and salary required to (a) General Manager, (b) Personnel Manager, South Wales Switchgear, Ltd., Blackwood, Mon. (P 718)

OVERHEAD lines consulting engineers require OVERHEAD LINES ENGINEER with sound design and constructional experience up to and including 132 kV. The successful applicant would be concerned with the selection of materials, specifications, tender analysis and contract matters. Salary according to qualifications and experience but not less than £1,000 per annum. Pension scheme available.—Applications, with full details of qualifications and experience, to Preece, Cardew and Rider, 8 and 10 Queen Anne's Gate, Westminster, S.W.1. (P 717)

PROGRESS CLERK required for industrial switchgear department. Previous experience in erection and machine shop work an advantage.—Applications in writing giving particulars of age, training, experience and salary expected to Employment and Welfare Manager, Johnson and Phillips, Ltd., Victoria Works, London S.E.7. (P 709)

REQUIRED FOR MIDDLE EAST. (*a*) First-class OVERHEAD LINESMEN experienced in the erection of steel and wood poles and lines up to 11 kV, with copper conductors, suspension insulators, straining wire, etc; (*b*) First-class PLUMBER JOINTER experienced in jointing paper insulated cables, lead covered and armoured, up to 11 kV.—Apply, stating age and experience. Forward copies of testimonials or state names to whom we may apply to Box No. 1339, Electrical Times. (P 538)

RESEARCH ENGINEER required by Cooke and Ferguson Ltd., Manchester, for interesting and responsible work. Applicants should be 23 to 30 years of age and of H.N.C. or degree standard. Experience of materials testing and processing, or thermal and di-electric phenomena, particularly relating to switchgear, will be an advantage.—Please reply, stating full information and salary required, to Personnel Manager, Cooke and Ferguson Ltd., Openshaw, Manchester 11. (P 666)

RUBBER and thermoplastic cables. Graduate or qualified ELECTRICAL ENGINEER required in the Cable Design and Technical Service Section of British Insulated Callender's Cables, Ltd., at Leigh, Lancs. Experience in the manufacture and/or design of rubber and thermoplastic cables desirable.—Applications, stating age, salary required, and giving full details of experience and qualifications, should be addressed to: The Staff Officer, B.I.C.C., Ltd., Prescot, Lancs. (P 712)

SECRETARY. Applications are invited for the post of the Secretary of the British Electrical and Allied Manufacturers' Association (Inc.). Experience in the electrical industry is not so essential as a wide experience in secretarial duties in a progressive organisation. —Applications giving full particulars including training, positions held, professional and other qualifications, age, and salary required, should be marked "Private" and addressed to "The Director, The BEAMA, 36 Kingsway, London W.C.2." (P 590)

SENIOR DESIGN DRAUGHTSMAN required by light engineering firm for design work on precision limit switches. Applicants must have had wide experience in this class of work, in the radio or instrument manufacturing industry.—Burgess Products Co., Ltd., (Micro Switch Division), Dukes Way, Team Valley, Gateshead 11. (P 716)

SENIOR PLANNING ENGINEER required by Sunvic Controls Ltd., to take charge of production planning at their new Harlow factory. Applicants must have had several years' experience in a similar capacity and be capable of programming a wide variety of electrical and mechanical process control equipment for both small and large scale production. Housing accommodation will be allocated to the successful applicant.—Apply in writing to Chief Engineer, Sunvic Controls Ltd., No. 1 Factory, Eastern Industrial Estate, Harlow, Essex. (P 728)

TECHNICAL ASSISTANT required for London. Work involves structural design in connection with overhead transmission and distribution lines and experience preferable but not essential. Applicants should possess Higher National Certificate in Civil Engineering. Equivalent electrical qualifications an advantage. Pension fund. Staff canteen. Five-day week. Salary according to qualifications and experience.—Apply in writing to Staff Officer, British Insulated Callender's Construction Co. Ltd., 21 Bloomsbury Street, London W.C.1. (P 732)

TECHNICAL ASSISTANTS. Applications are invited from radar and electronic technicians for appointment as civilian technical assistants, Grade 3, in Anti-Aircraft Command units situated throughout Great Britain. Applicants must have experience of the repair and maintenance of radar and electronic equipment and hold the Ordinary National Certificate in electrical engineering or its equivalent. Salary range is £460 to £575 (in the London area). Starting salary will be fixed according to age, qualifications and experience. Annual increases are payable subject to satisfactory service. Excellent opportunities for promotion to higher grades exist in all areas. Candidates should submit their applications in writing, stating age, qualifications, experience and area preferred, to Ministry of Labour and National Service, Milton Road, Wealdstone, Middlesex, quoting Order No. 14. (P 704)

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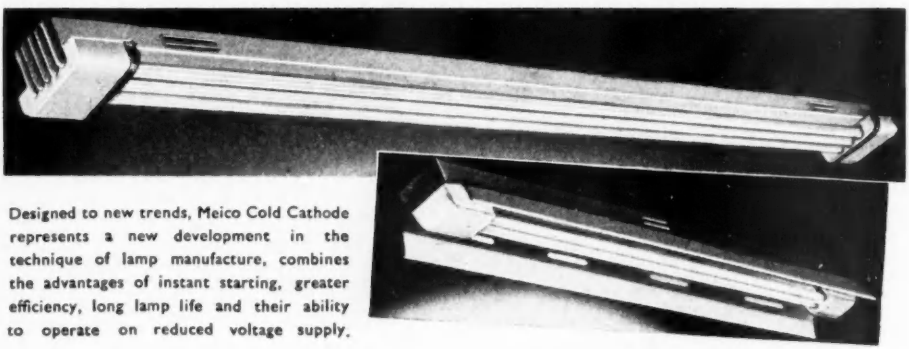

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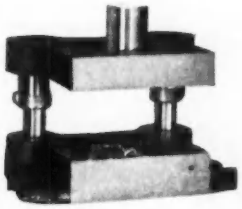

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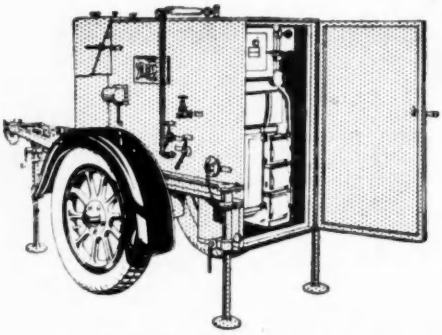

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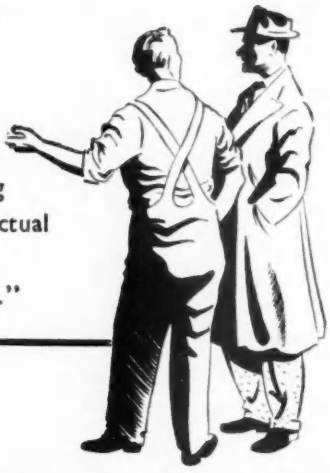

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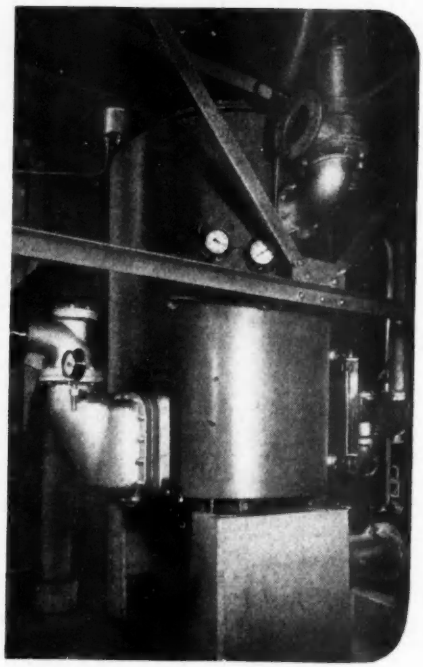

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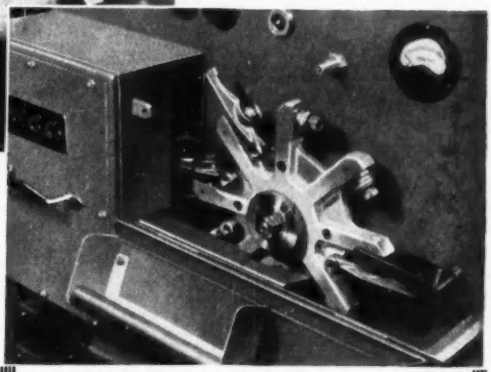
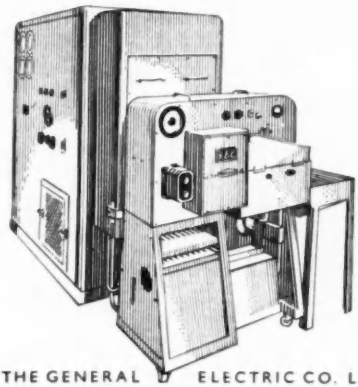


- Rocker pads go into a G.E.C. rocker pad hardening machine in the production line at the works of Leyland Motors Ltd.
- The indexed motor which carries the parts through the hardening process.



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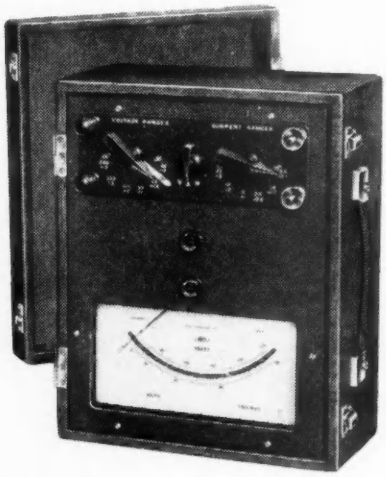

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ELECTRIC CONSTRUCTION BOOSTS GAS AT BIRMINGHAM

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J. E. WAKEFORD, Esq.
M.B.E., M.Inst.Gas E., M.Inst.F.
Divisional Manager.

This Electric Construction motor driving a booster at the Washwood Heath plant of the West Midland Gas Board (Birmingham District) is a 460 B.H.P. fully compensated D.C. machine with a speed range of 750/1750 R.P.M. It is pressure-ventilated from separate motor-driven fans.
The control gear for this motor and the rectifier which supplies it are of E.C.C. make.

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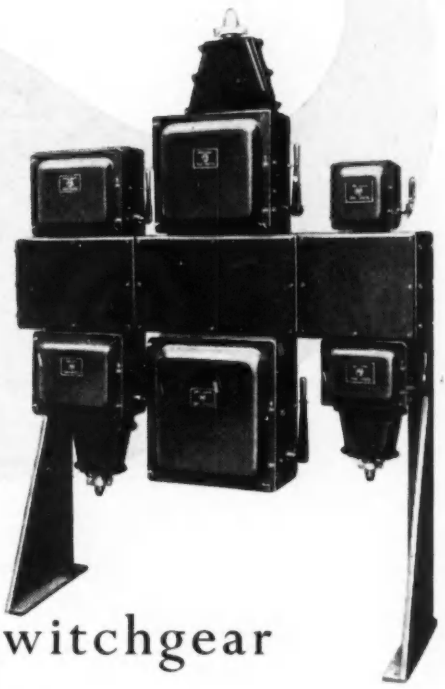

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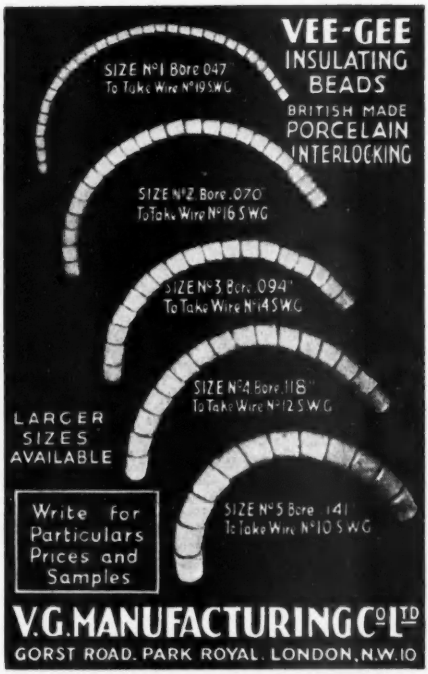
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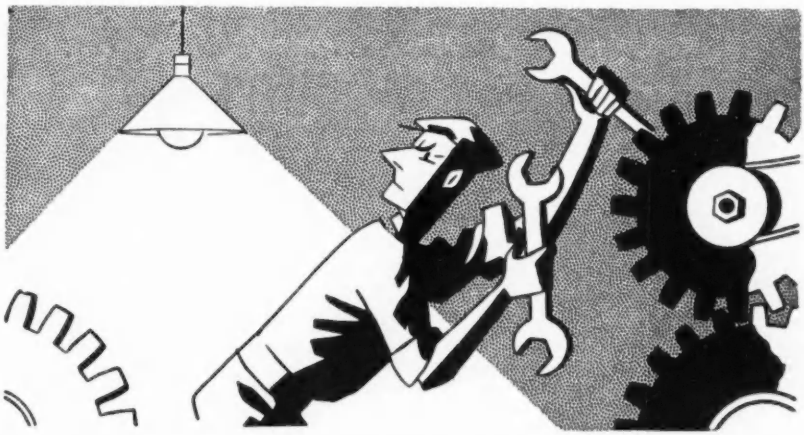

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HOW can operators put a fine finish on their work when the lighting system casts shadows over their machines? Again and again, production and morale problems vanish away when a modern lighting system is installed. In up-to-date factories all over Britain, Philips Fluorescent Lighting has improved quality and output quite remarkably — for it gives each individual machinist the ideal light for his job — with no glare, no shadow. He smiles as he works!

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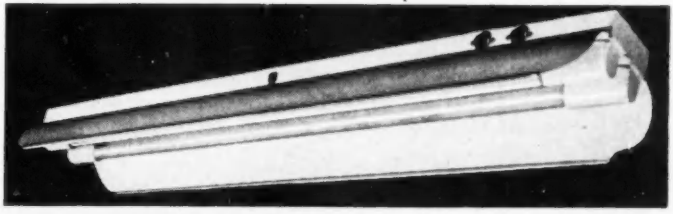

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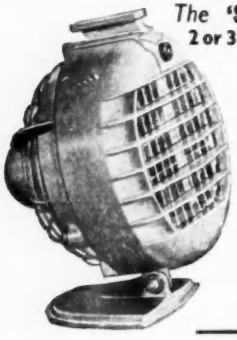

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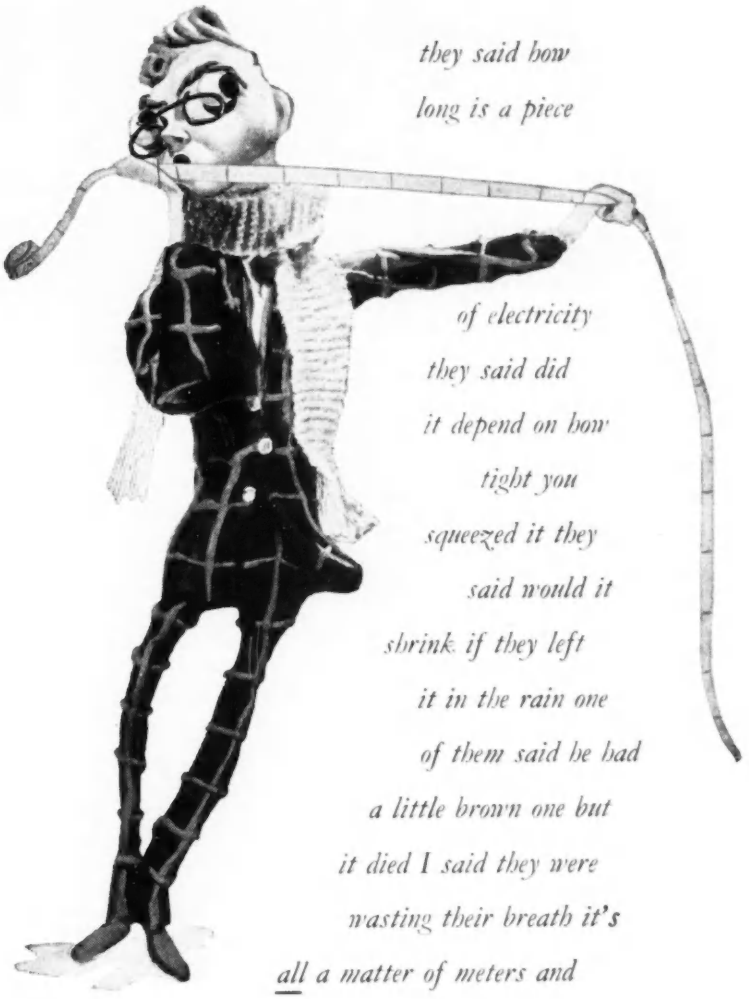

they said how
long is a piece
of electricity
they said did
it depend on how
tight you
squeezed it they
said would it
shrink if they left
it in the rain one
of them said he had
a little brown one but
it died I said they were
wasting their breath it's
all a matter of meters and

meters are matters for

MEASUREMENT

MEASUREMENT Ltd. Electricity Meter Division, Tameside Works, Dobcross, Nr. Oldham, Lancs, Tel: Delph 291
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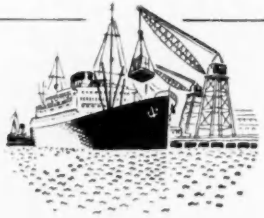

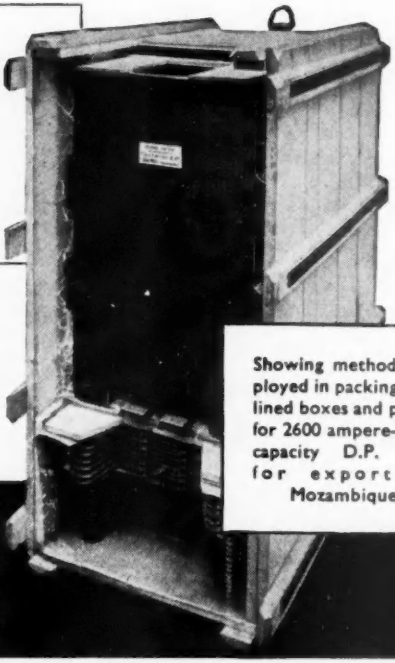

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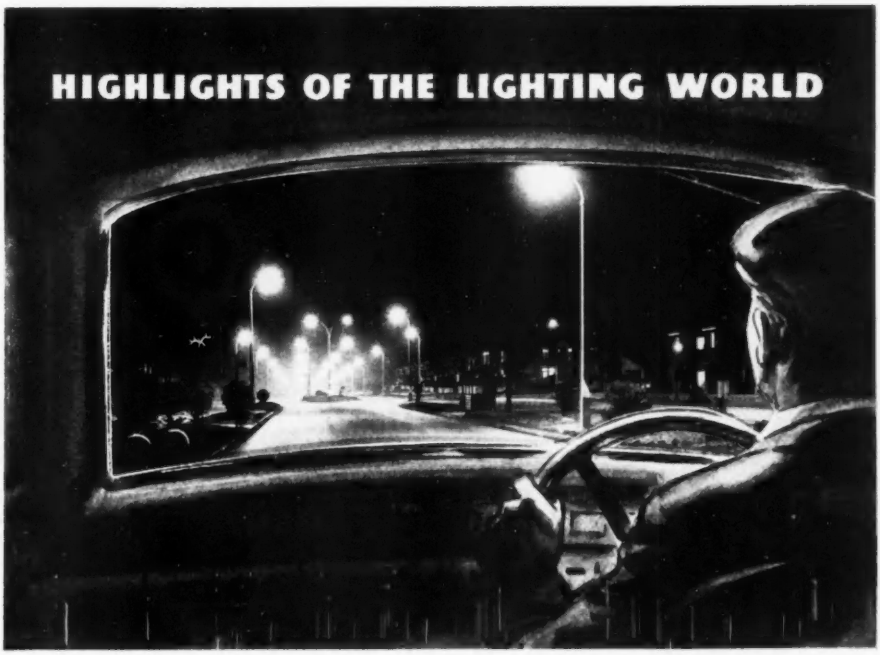

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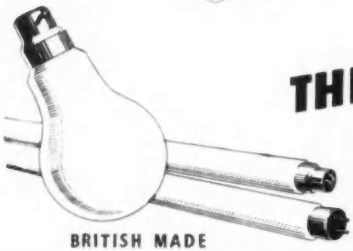
for road safety



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No. 3

ESSEX BEAUTY SPOTS

The illustration and information are taken from "Journeying into Essex," by W. R. Finch —printed by S. E. Recorders Ltd., Ilford.

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CLYDE WORKS, CHADWELL HEATH, ESSEX

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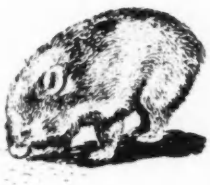
Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts, and published at Sardinia House, Sardinia Street, London W.C.2. January 24, 1952

TRANS-WORLD QUIZ

✱

Where would you be in the native company of a 'teddy-bear' a dingo, a wombat, a platypus and a dugong?

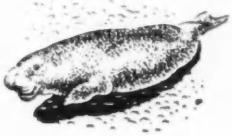


What

is the smallest continent and the largest island in the world?

Where

does a man with a wife and child pay only £5 income tax on £400 p.a.?



THE answer to all three questions is--Australia. They are very good friends of Great Britain are the Australians. They send us more than £200,000,000 worth of food and wool each year to help us eat and keep warm. And they buy more than £250,000 000 worth of our exports. Part of those exports are thousands of the world-famous Parnall Electric Cookers and Washing Machines. Which is one reason why, for the time being, we cannot meet the Home Market's demands.

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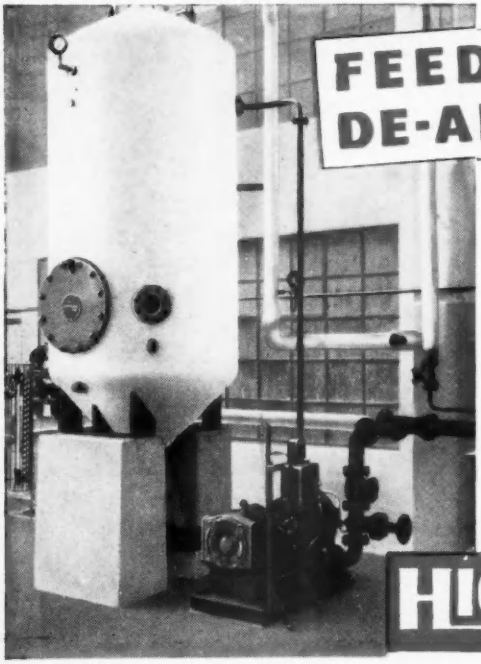

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The illustration shows a re-circulating de-aerator 80,000 *lbs/hr capacity in New Zealand milk processing factory.*

H119A

HICK HARGREAVES
AND COMPANY LTD BOLTON